SPECTRUM®

Data Export User's Guide
Version 5.0rev1

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Preface

Describes this manual's audience, organizational structure, and typographical conventions, user prerequisites, elated SPECTRUM documentation, and how to get information or submit comments about SPECTRUM documentation.

Welcome to the ***SPECTRUM Data Export User's Guide***. This guide describes how to use SPECTRUM Data Export (Data Export) to extract data from SPECTRUM databases and convert it to either ASCII, SAS, or SQL format.

Who Should Read This Guide

This guide is intended for network administrators and qualified users who use Data Export to export data from SPECTRUM for analysis using a report generator, database, spreadsheet, or statistical analysis application.

Prerequisites for Users

Prior to using Data Export, users should be familiar with the following information-system components involved in a data export:

- The capabilities of the platform on which SPECTRUM is running:
  - NT
  - UNIX (Solaris)
- The administrative and operational capabilities of SPECTRUM Enterprise Manager:
  - SPECTRUM database concepts, including the data types stored in the database
  - SpectroGRAPH graphical user interface
- The application (e.g. , DBMS) to which data is exported

How to Use This Guide

This guide is organized as follows:

Chapter	Description
Chapter 1 *Introduction to Data Export*	Provides an overview of SPECTRUM Data Export capabilities.
Chapter 2 *Accessing the Data Export Window*	Describes how to access and work with the SPECTRUM Data Export window.
Chapter 3 *Creating Definition Files*	Describes how to create and save Data Export definition files.
Chapter 4 *Exporting Data*	Describes how to immediately start a data export and how to schedule an export with the Scheduler utility; discusses NT scheduling requirements; describes the output produced from ASCII, SAS, and SQL data exports.
Chapter 5 *SAS Exports*	Provides information about SAS export requirements and considerations.
Chapter 6 *Ingres Exports*	Provides information about Ingres export requirements and considerations.
Chapter 7 *Sybase Exports*	Provides information about Sybase export requirements and considerations.
Chapter 8 *Oracle Exports*	Provides information about Oracle export requirements and considerations.
Chapter 9 *Microsoft SQL Server Exports (NT)*	Provides information about Microsoft SQL Server export requirements.

Appendix	Description
Appendix A *Data Structure of ASCII Files*	Describes ASCII file format specifications for SPECTRUM data types using sample data.
Appendix B *Data Structure of SAS Data Sets*	Describes SAS format specifications for SPECTRUM data types using sample data.

Appendix	Description
Appendix C *Data Structure of SQL Tables*	Provides SQL (Ingres, Sybase, Oracle, and Microsoft SQL Server) format specifications for SPECTRUM data types using sample data.
Appendix D *Data Export Resource File*	Describes the Data Export resource file and how to configure it before and after installing Data Export.
Appendix E *Exporting To Other Databases*	Describes how a post export script can be used to export data to other databases.
Appendix F *SAS Graph Examples of Exported SPECTRUM Data*	Shows examples of how data exported from SPECTRUM with Data Export is depicted in SAS GRAPHs.

Typographical Conventions

This manual uses the following typographical conventions:

- Referenced chapter titles and sections of this document appear in *italics* (*hypertext-blue italics* for on-line readers). For example:

  See *Command Icons* on Page 2-4 for more information on the Data Export window icons.

- Referenced Cabletron manuals appear in ***bold italics***. For example:

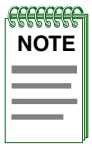
  See the ***SPECTRUM Installation Guide*** for SPECTRUM installation procedures.

- System input, output, parameters, filenames, and directories appear in `Courier` font. For example:

  The default database name is specified by the `DBDefaultName` resource file parameter.

- Referenced application window fields, buttons, and menus and menu options appear in **bold**. For example:

  Click the **Export Now** icon.



Calls your attention to information of special importance.

Calls your attention to any action that may adversely effect application performance.

Related SPECTRUM Documentation

Refer to the following documentation (see http://www.cabletron.com) for detailed information on using SPECTRUM resources referenced in this manual:

- ***SPECTRUM Operator's Reference***

  Describes how to work with SPECTRUM. It includes information on starting and stopping SPECTRUM and working with SPECTRUM icons, menus, views, and utilities.

- ***SPECTRUM Administrator's Reference***

  Describes how to manage SPECTRUM software. It includes information on modeling network elements with SPECTRUM, managing SPECTRUM security, monitoring and managing SPECTRUM performance, and SPECTRUM database management.

- ***SPECTRUM Installation Guide***

  Describes how to install SPECTRUM products.

- ***SPECTRUM Model Type Editor User's Guide***

  Describes how to define and modify model type attributes and relation rules in the SPECTRUM database.

Questions about SPECTRUM Documentation

Send your questions, comments or suggestions regarding SPECTRUM documentation to the Technical Communications Department directly via the following internet address:

spectrum-techdocs@ctron.com

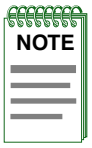
Chapter 1

Introduction to Data Export

Provides an overview of SPECTRUM Data Export capabilities.

Overview

Data Export is a data extraction and export application. Data Export can extract data from one or more SPECTRUM databases and convert it to the data format that you specify — either ASCII, SAS, or SQL. You can then import the reformatted data into a report generator, database, spreadsheet, or statistical analysis application of your choice.



When the term “SQL” is used in this manual, the associated information applies to Ingres, Sybase, Oracle, and Microsoft SQL Server tables.

SPECTRUM Data Types

Data Export lets you export the following SPECTRUM data types:

- Current Data
  - Model Types — Objects from which discrete network device, application, or entity models are instantiated.
  - Model Type Hierarchy — Instances of a model type's parent and child model type.
  - Models — Instances of discrete model types.
  - Attributes — Characteristics that define discrete models.
  - Extended Attributes — Additional attributes that relate models to the SNMP OIDs supported by those models.
  - Associations — Objects that identify the relationship between models.

  - Relations — Objects that identify the type of associations between models.
  - Rules — Objects that define the restrictions governing relationships.

- Historical Data
  - Events — Instances of events recorded by SPECTRUM for SPECTRUM models.
  - Statistics — Performance indices for a model.

Data Export Files

This section briefly describes the Data Export files you will work with to configure Data Export parameters:

- Definition files
- Data Export Script file
- Resource file

Definition Files

Before you can export data with Data Export, you must first create and save a definition file for the export. It specifies the data to export and the format of the output.

You will specify the following information in a definition file:

- A list of landscapes from which you want to export data.
- The name you want to assign to the output (file, data set, or table) when it is created and the directory (ASCII/ SAS) or database table (SQL) where you want to store the output.
- The format (ASCII, SAS, or SQL) of the output.
- The types of current data – model types, model type hierarchy, models, attributes, extended attributes, associations, relations, and rules – to export.
- The types of historical data – events and statistics – to export.
- The historical period from which to export events and statistics data.

Data Export Script (dtxscript) File

You will set environment variables for SAS and SQL exports in the `dtxscript` file.

Resource File

Data Export reads the Data Export resource file, `SDE`, at startup to determine and establish various Data Export operational settings, such as field values, color schemes, and text fonts in the Data Export window and windows that can be derived from it. You can either accept the default settings in the resource file or change them to customize Data Export. You can also override default settings in the Data Export window for any specific definition file open in the window using configuration procedures provided or permitted by the window (see Chapter 3).

The Data Export Process

You will perform the following tasks to perform a data export with the Data Export application:

- Invoke Data Export
  See Chapter 2.
- Create and save a definition file
  See Chapter 3.
- Execute Data Export immediately or schedule an export
  See Chapter 4.

When Data Export has completed an export, the information for each data type specified in the definition file is stored in a separate ASCII file, SAS data set, or SQL table. As long as you are working with the same SPECTRUM database, you can save the definition file and reuse it as often as you wish.

Special Considerations

This section discusses special considerations involved in using Data Export.

For All Users

You should create new definition files each time you use a new SPECTRUM database. This is necessary because SPECTRUM assigns new model handles every time it starts with a new database. Data Export extracts statistical and event information based on these model handles. Therefore, if you use old versions of definition files with a newly created database, the extracted information for a particular model handle may pertain to more than one model. Reports generated from this type of data will be inaccurate.

At installation, Data Export writes an application resource file, named `SDE`, in the `.../Spectrum/app-defaults` directory. The `SDE` file establishes the default Data Export start-up parameters. To modify default parameters, you must edit parameter values.

See Appendix D for more information.

General Error Handling

All error messages are written to a log file produced during an export. They were designed to be as explicit as possible so as to identify the cause of a problem. UNIX system error codes have been included in the error messages wherever possible. Check your system's `errno.h` file for if you want a description of the error number found in such messages.

See *Checking Export Output* on Page 4-7 for information on log files and other indicators pertaining to the success or failure of an export.

For SQL and SAS Users

Before using Data Export, verify that the SQL or SAS product is properly installed and functioning. Failure to do so may produce unpredictable results.

Also, you must update the `dtxscript` file to set up SQL and/or SAS for the export. See the following chapters for information on configuring the `dtxscript` file for the data format you specify:

- Chapter 5 for SAS
- Chapter 6 for Ingres
- Chapter 7 for Sybase
- Chapter 8 for Oracle
- Chapter 9 for Microsoft SQL Server (NT only)

For SAS Users Only

Before using Data Export, SAS users should consider the items in the following sections.

SAS Packaged Reports

During installation, Data Export installs several SAS packaged reports in the directory, `sas_reports`, under the `...Spectrum/SG-Tools` directory. Each report file includes comments about the local changes that may be required.

Follow these general rules when you use SAS packaged reports:

- Set the environment variable, `CTRON`, to the location of the SAS data sets.
- If you are executing reports from a directory other than the one in which they reside, you must also either copy the macros, `get_ts.sas` and `exist.sas`, to your `sasautos` directory, or add the following entry to your `config.sas` file:

  ```
  -sasautos <sas reports path>
  ```

- The reports assume that you are using the default landscape handle, 0x400000. If your landscape handle is different, you must change the variable, `inlh`, in the reports file to the decimal equivalent of your landscape handle.
- The reports also assume that SAS data sets will have default names. If your data set names are not the same as the default, change the reports programs accordingly.

Error Handling

Under some circumstances (an attempt to append statistical export data to an existing, but corrupt, SAS data set for example) an error message may indicate that a particular export operation was unsuccessful (i.e., unsuccessful updating of the `impoinfo` file), when, in fact, the preceding export operation first encountered the problem.

Therefore, if errors are encountered during an export, the integrity of all output files should be checked. See Chapter 3 for information on how to append information to an output data set. See Chapter 5 for specific troubleshooting solutions.

Chapter 2

Accessing the Data Export Window

Describes how to access and work with the SPECTRUM Data Export window.

Overview

You invoke Data Export when you access the Data Export window (see *Accessing Data Export* on Page 2-2). The window enables you to create, save, open, and modify definition files for data export as well as execute or schedule the data export. The window is organized into the following sections:

- Application Commands — Includes pull-down menu options and command icons that enable you to open and save an export definition file, start a data export, schedule a data export, clear or restore default definition file parameters, and access on-line user documentation.

  See *Application Commands* on Page 2-3.

- General Information — Enables you to enter a description or comments about a definition file, specify the landscapes from which data is exported, specify the format of exported data, specify format options for ASCII output, specify the data output directory, specify a post-output script or executable file, and specify a database where data output in an SQL format is exported.

  See *General Information* on Page 2-5.

- Historical Data — Enables you to specify the data to export from the SPECTRUM events and statistics database.

  See *Historical Data* on Page 2-7.

- Current Data — Enables you to specify the SPECTRUM data types to export.

  See *Current Data* on Page 2-9.

Accessing Data Export

To access Data Export:

Select the **Export Data** option from the SpectroGRAPH **File** menu, as indicated in Figure 2-1.

The Data Export window (Figure 2-2) opens.

Figure 2-1. Accessing Data Export from the SpectroGRAPH File Menu

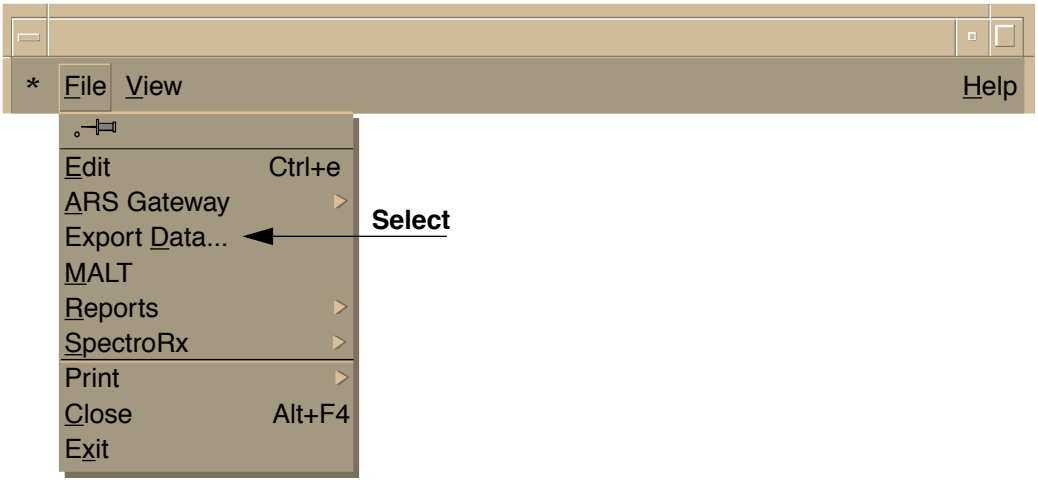
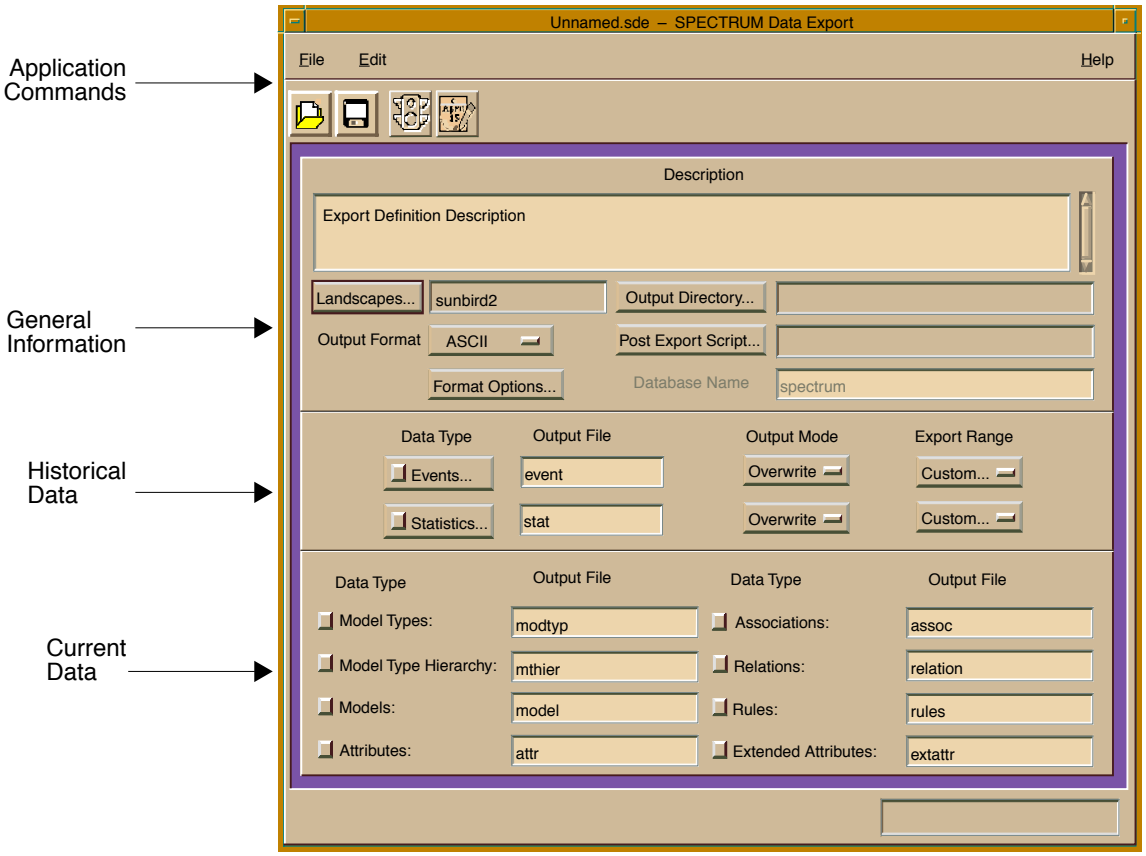


Figure 2-2. Data Export Window



Application Commands

This section describes the application command options you can access from either the pull-down menus or the command icons available from the Data Export window.

Menus

Data Export window pull-down menus, **File** and **Edit**, include the complete set of application commands for the Data Export application. This section describes the command options available from each menu.

Describing File Menu Options

The **File** menu includes the following command options:

Open	Opens an existing definition file. See Chapter 3 for details.
Save	Saves a new file or a file that you have modified. See Chapter 3 for details.
Save As	Saves another version of an existing file. See Chapter 3 for details.
Export Now	Executes a data export. See Chapter 4 for details.
Schedule Export	Opens the Scheduler window, which enables you to schedule an export at a future time. See Chapter 4 for details.
Close	Closes the Data Export window.

Describing Edit Menu Options

The **Edit** menu includes the following command options:

Clear All Entries	Clears all entries, including default entries, in the Data Export main window.
Reset To Defaults	Restores default settings for all entries. See Appendix D for information on establishing default settings.

Describing Help Menu Options

The **Help** menu includes the following options:

About Data Export	Opens a dialog box listing the Data Export version number and a copyright notice.
User's Guide	Opens an online copy of this manual.

Command Icons

Command icons provide you with an another way to issue most of the application commands available from the application command menus.

Describing Icons

This section describes icon functions.

The **Open** icon opens a definition file selection window. See Chapter 3 for details.

The **Save** icon saves a new file or changes you have made to a file. See Chapter 3 for details.

The **Export Now** icon starts an export. See Chapter 4 for details.

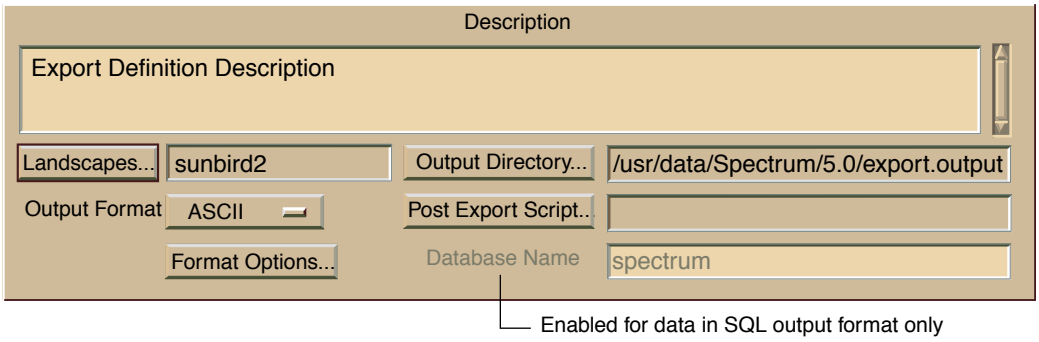
The **Schedule Export** icon opens the Scheduler window. It enables you to schedule an export at a future time. See Chapter 4 for details.

General Information

The General Information section of the Data Export window, shown in Figure 2-3, enables you to provide comments about the definition file, specify the landscapes from which you want to export data, specify the data's output format, specify the directory to which you want to save exported data, specify a post-export script or executable file, and for SQL data only, specify a database name.

See *Setting General Information Parameters* on Page 3-4 for information on specifying general information parameters

Figure 2-3. General Information Section



Describing General Information Section Fields and Buttons

This section describes the fields and buttons included in the General Information section.

Description — Enables you to enter comments (optional) about a definition file.

Landscapes — Enables you to select the landscape(s) from which you want to export data.

Output Format — Enables you to specify the format for the exported data. (Other options on the window change in response to the format you select.)

Format Options — This button is available only after you have selected ASCII with the **Output Format** button. It enables you to access the Format Options dialog box, where you select the format options for the ASCII output file (see Chapter 3 for details). These options include field separators, record separators, quoted strings, data and schema file options, time format, and handle format.

Output Directory — Enables you to access the Output Directory dialog box. The Output Directory contains the name of the directory where the exported data is stored. (For SQL formats, it is the log directory where the log file and temporary files created by Data Export are stored.)

Post Export Script — Enables you to access a file selection dialog box. The file you select is invoked following the successful completion of the export. For example, you can specify a script to import the data into either a spreadsheet, database, or a statistical analysis application.

(On the NT platform, the file you specify must be a script file; on all other platforms, this file can be either a script file or a compiled executable file.)

Database Name — This field is available only after you have selected an SQL data format with the **Output Format** button. It enables you to specify a name for the database where you want to store SQL data. You can accept the default name (`spectrum`) or provide another name for the current file by overwriting or modifying the default name.

Historical Data

The Historical Data section (Figure 2-4) enables you to specify the types of events and/or statistics data to export from your choice of the SPECTRUM models included in your choice of the landscapes specified in the Preferred Landscapes list (see *Describing General Information Section Fields and Buttons* on Page 2-6). It also enables you to specify the historical period from which to export data, the previous day, week, or month, or a more precise range (e. g., a 12-hour period from two weeks ago).

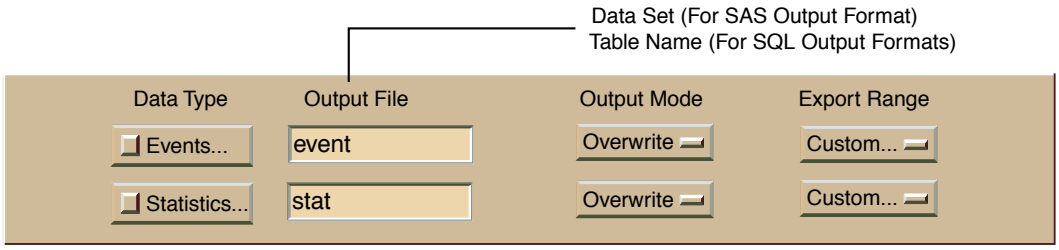
For events and statistics output files, you can specify whether to overwrite data in or append data to existing files, data sets, or tables, or for ASCII data only, create new files with the date and time the file was created concatenated to the file name.

Figure 2-4 shows a Historical Data section of the Data Export window when the ASCII output format has been specified. This section changes, however, when other output formats have been specified:

- When the SAS output format has been specified, the **Data Set** field replaces the **Output File** field.
- When an SQL output format has been specified, the **Table Name** field replaces the **Output File** field.

See *Setting Historical Data Parameters* on Page 3-9 for information specifying historical data parameters.

Figure 2-4. Historical Data Section



Describing Historical Data Section Fields and Buttons

This section describes the functions of the fields and buttons included in the Historical Data section.

Data Type

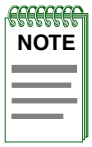
Enables you to specify if you want to export events (**Events** button) and/or statistics (**Statistics** button) data.

Output File (ASCII)

Data Set (SAS)

Table Name (SQL)

Enables you to provide the name for the output file, data set, or table to which the data you want to export is saved.



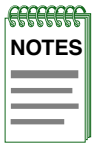
Data Export provides a default name for the **Output File/Data Set/Table Name** field, which you can change in the resource file (see Appendix D). For SAS and SQL formatted data however, the name you provide in the output field must conform to established naming rules for data sets and tables.

Output Mode

Enables you to specify whether to overwrite or append events and/or statistics data to an output file for non-ASCII data. For data in ASCII format, it enables you to create a new output file with the creation date and time included in the file name.

The toggle button offers the following selections:

- **Overwrite** — Overwrites the file, data set, or table you specify in the output field.
- **Append —** Appends the exported data to the file, data set, or table you specify in the output field.
- **Date** (for ASCII format only) — Creates a new file with a date and time stamp added to the file name you specify in the **Output File** field.



If you attempt to overwrite or append data to a nonexistent file, Data Export creates a new file.

The **Append** output mode should only be used in a statistics report when you are exporting the same type and number of attributes.

Export Range

Enables you to specify a time range from which to export events and statistics data. The toggle button offers the following selections:

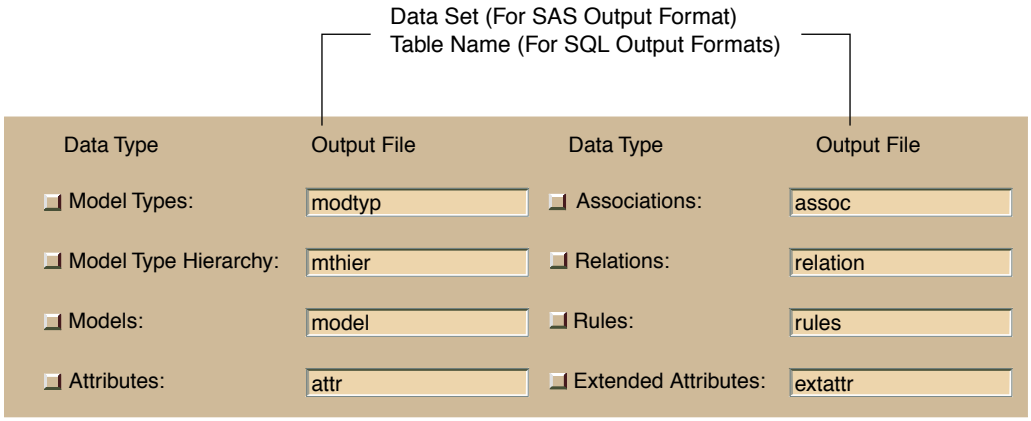
- **Custom —** Opens the Events Data Range dialog box, which you can use to specify precisely the export time range. See *Specifying a Custom Data Range* on Page 3-19 for details.
- **Day** — Specifies the preceding 24-hour period.
- **Week** — Specifies the preceding 7-day period.
- **Month** — Specifies the preceding 30-day period.

Current Data

The Current Data section, shown in Figure 2-5, enables you to specify the types of data you want to export from the SPECTRUM database(s).

See *Setting Current Data Parameters* on Page 3-21 for information on specifying current data parameters.

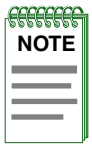
Figure 2-5. Current Data Section



Describing Current Data Section Fields and Buttons

This section describes the functions of the fields and buttons in the Current Data section.

Data Type — Enables you to specify the types of data you want to export by clicking on their corresponding buttons.



For a models export, Data Export acknowledges only the first 32 characters of model names by default. If you require display of more than 32 characters, you must change the value of the `SDE_OUTPUT_MODEL_LEN` variable in the `dtxscript` file (located in the `SG-Tools` directory). You can specify display of up to 1024 characters for ASCII, Oracle, and Ingres exports, 255 characters for Sybase and Microsoft SQL Server exports, and 200 characters for SAS exports.

Output File (ASCII)
Data Set (SAS)
Table Name (SQL)

Enables you to provide the name for the output file, data set, or table for the types of data you want to export. You must accept the default name or enter a name for each data type you specify.

Chapter 3

Creating Definition Files

Describes how to create and save Data Export definition files.

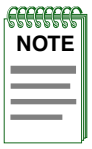
Overview

Before you can export data with Data Export, you must first either open an existing definition file, open and save new definition file, or save a modified version of an existing definition file. See *Opening and Saving Definition Files* on Page 3-2.

The definition file specifies the types of data to export, the format of the extracted data, and whether or not you want a post-export script executed after the export. To create a definition file, you specify data export parameters in the following sections of the Data Export window:

- General Information — the landscapes to import data from, the output format for the exported data, a post-export script, and the database name for exported data in SQL format
  See *Setting General Information Parameters* on Page 3-4.
- Historical Data — SPECTRUM events and statistics data
  See *Setting Historical Data Parameters* on Page 3-9.
- Current Data — model, relations, associations, and attribute data types
  See *Setting Current Data Parameters* on Page 3-21.

If you are unfamiliar with the Data Export window, see Chapter 2.



Default settings for the Data Export window and other windows and dialog boxes you can invoke from it are specified in the Data Export resource file, `SDE`. See Appendix D for information on `SDE` parameters and how to modify them.

Opening and Saving Definition Files

This section describes how to open and save definition files.

Opening a Definition File

To open a new file:

Invoke Data Export (see Chapter 2). The Data Export window appears. It displays default or empty settings that you can configure and save for the export. Until you name the file, the default filename, `Unnamed.sde`, appears on the window's title banner.

To open an existing file:

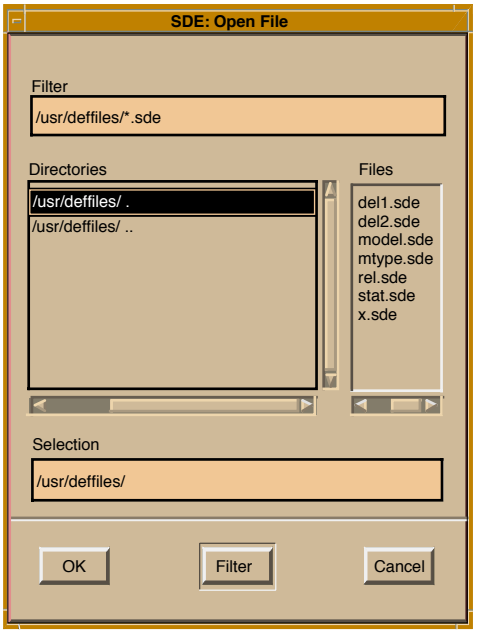
1. Click the **Open** icon, or select **Open** from the File menu.

   An Open File dialog box (Figure 3-1) appears. Use the **Filter** option to navigate to the correct directory, select a file, and click the **OK** button. The Data Export window displays the configuration settings for the selected file.

2. Configure the file as desired.

3. Save the modified definition file as described in *Saving a Definition File* on Page 3-3.

Figure 3-1. Open File Dialog Box



Saving a Definition File

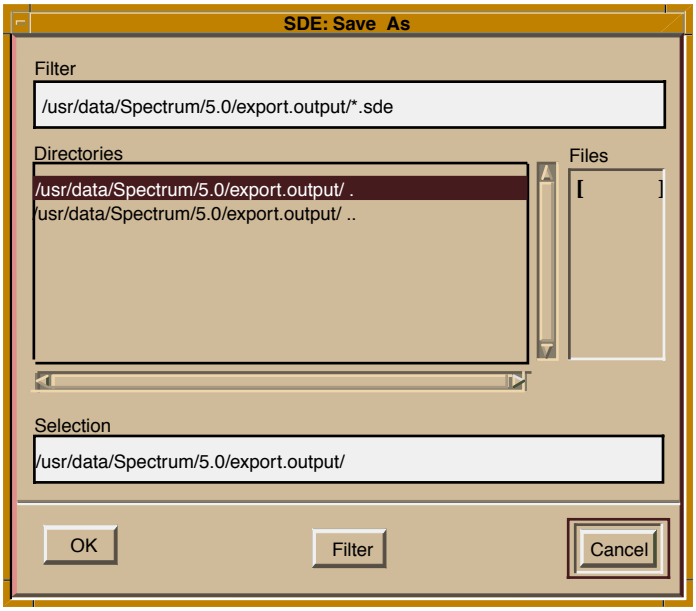
To save a definition file:

1. Click the **Save** icon, or select **Save** or **Save As** from the File menu.

   - Select **Save** if you want to save an original file or changes to an existing file.
   - Select **Save As** if you want to save a new version of the original file and retain the original file.

     Whenever you select **Save As** or select **Save** to initially save a new file, the Save As dialog box (Figure 3-2) appears. It enables you to enter the name of the new file (original file or modified version of an existing file).

Figure 3-2. File Selection Dialog Box



2. Enter a name for the definition file.

   Use the **Filter** option to navigate to the correct directory path. Enter a file name at the end of the path in the **Selection** field. Data Export appends the definition file extension, `.sde`, when you execute the save.

3. Click the **OK** button to save the file.

   The filename appears on the Data Export window's title banner, and the file is saved to the Data Export default definition file directory, `export.output`, specified by the `DefFileDefaultDir` parameter in the `SDE` resource file or another directory that you specified.

Setting General Information Parameters

To specify General Information parameters:

- Enter information (optional) about the file in the **Description** field.

  You can use this field to describe the purpose or scope of the definition file. This information appears in the field whenever you re-open the file and in the log file (chronicle of export activities) Data Export writes to the output directory when you export data with the file.

- Select the landscapes from which to export data.

  Either accept the landscape(s) listed in the **Landscapes...** field or modify the list as described in *Specifying Landscapes* on Page 3-5.

- Select the output format for the exported data.

  Use the **Output Format** button to select one of the following formats:

  - ASCII
  - Ingres
  - Sybase
  - Oracle
  - SAS
  - Microsoft SQL Server (NT platform only)

- Specify the output directory for exported data files, tables, or data sets.

  Either accept the default directory displayed in the **Output Directory...** field or specify another directory as described in *Specifying an Output Directory* on Page 3-6.

- Specify a post export script (optional).

  Either accept the default post export script (if one is displayed) or select another script that you want run after the export has been completed as described in *Specifying a Post Export Script* on Page 3-7.

- Specify format options for ASCII data.

  Either accept default ASCII format options or change format options as described in *Setting ASCII Format Options* on Page 3-7.

- Specify the database name for SQL data.

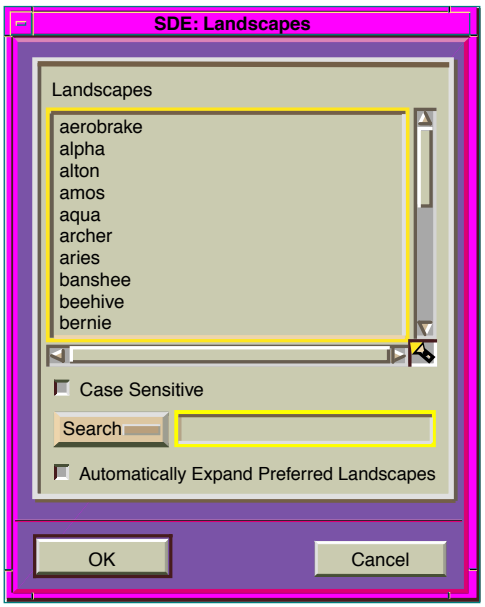
  Either accept the default database name displayed in the **Database Name:** field or specify another database name.

  The **Database Name:** field displays the default database name specified by the `DBDefaultName` parameter in the `SDE` resource file. To replace the default name for the current file, type a new name in the **Database Name** field.

Specifying Landscapes

The **Landscapes...** field lists the default landscape(s) specified by the `PreferredLandscapes` parameter in the `SDE` resource file. To specify landscapes, click the **Landscapes...** button to open the Landscapes dialog box (Figure 3-3). The dialog box enables you to add or remove landscapes from the list.

Figure 3-3. Landscapes Dialog Box



How to work with the Landscapes dialog box:

- To select the landscape(s) you want to include, double-click on the landscape(s). Deselect the landscape(s) you want to remove.
- To specify that models of a selected model type for all preferred landscapes are automatically listed when s specifying events or statistics filter criteria (see *Setting Historical Data Parameters* on Page 3-9), select the **Automatically Expand Preferred Landscapes** button. Deselect the option if you do not want to expand preferred landscapes.
- To locate landscapes, use the **Search** or **Filter** utilities.

  With **Search**, you type the name or the first few characters of the item you are searching for in the list. As you type characters, the list scrolls until the item or the closest match appears at the top of the list.

With **Filter**, you type the name or a character string contained in the item you are searching for. As you type characters, all items in the list that do not contain the characters are temporarily deleted. Unlike a search operation, the characters you are filtering on do not have to be at the beginning of an item.

By default, the **Search** and **Filter** operations are case sensitive. To specify a case insensitive operation, deselect the **Case Sensitive** option.

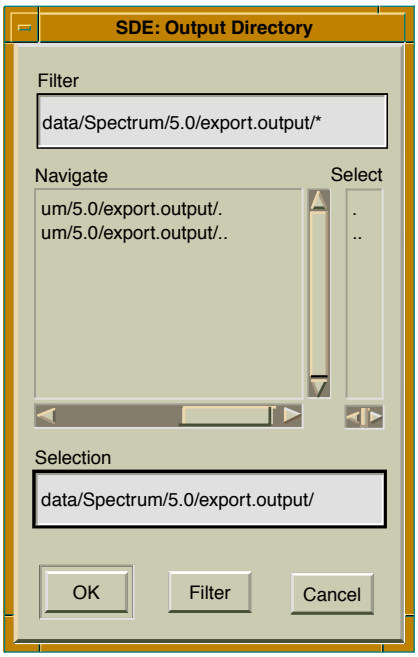
- To put the specifications into effect, click the **OK** button. To dismiss the operation, click the **Cancel** button.

Specifying an Output Directory

The **Output Directory...** field displays the default output directory specified by the `DefFileDefaultDir` parameter in the `SDE` resource file. To specify another output directory, click the **Output Directory...** button to open the Output Directory dialog box (Figure 3-4). The dialog box enables you to specify a directory for exported data files.

(For SQL formatted data, you are specifying a log directory here.)

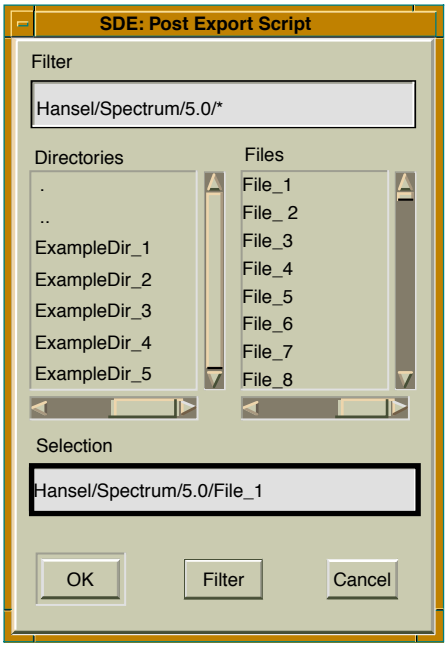
Figure 3-4. Output Directory Dialog Box



Specifying a Post Export Script

The **Post Export Script...** displays a default script if one has been specified for the `PostExportDefault` parameter in the `SDE` resource file. To specify another script, click the **Post Export Script...** button to open the Post Export Script dialog box (Figure 3-5). It enables you to select a script.

Figure 3-5. Post Export Script Dialog Box

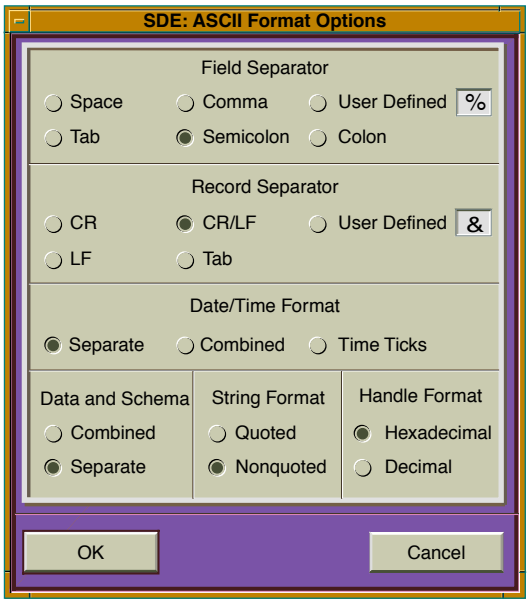


(See Appendix E for an example of how a post-export script is used to export data to a third-party database.)

Setting ASCII Format Options

Exported data saved in the ASCII delimited file format can be used as input for a variety of report generators, databases, and spreadsheets. Depending on the requirements for whichever of these you are using, you may have to define the format of the ASCII files. You can customize the file format using the Format Options feature. When you click the **Format Options** button, the ASCII Format Options dialog box shown in Figure 3-6 appears.

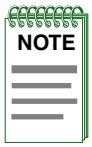
Figure 3-6. ASCII Format Options Dialog Box



The ASCII Format Options dialog box includes the following sections:

Field Separator — The buttons included in this section let you specify how you want the fields in the ASCII output file to be separated: with a space, tab, comma, semicolon, colon, or some other character that you define (User Defined).

Record Separator — The buttons in this section let you specify how you want the records in the ASCII output file to be separated: with a carriage return (CR), line feed (LF), carriage return and line feed (CR/LF), tab, or some other character that you define (User Defined).



The field separator and record separator can be any single keyboard character that is visible (for example, do not use a control character). The record separator must be different from the field separator. Also, do not use a character that your application may use to represent data.

Date/Time Format The buttons in this section let you specify how you want the date/time data to appear in the ASCII output file. If you select **Separate**, the time and date are split into two fields, one for date and one for time. If you select **Combined**, the time and date (separated by a space) are represented in one field. If you select **Time Ticks**, the time and date are represented in UNIX time ticks in one field.

If **Combined** is selected, do not use space as a delimiter. Space is used with the Combined field to separate the date and time.

Data and Schema The buttons in this section let you specify whether to combine ASCII data and schema files either into one file or separate files.

If you select **Combined**, the data and schema files are stored in the same file with the schema first.

If you select **Separate**, schema files will have the same names as the ASCII data files along with the `.sch` extension appended to them.

See Appendix A for more information on ASCII data files and schema format.

String Format The buttons in this section let you specify whether or not to enclose character data fields in the ASCII output file in double quotation marks.

Handle Format The buttons in this section let you specify whether to represent handles (model handles, attribute IDs, etc.) in either hexadecimal or decimal notation in the ASCII output file.

After you have made your selections in the ASCII Format Options dialog box, click the **OK** button to establish your specifications.

Setting Historical Data Parameters

This section describes how to use the Historical Data section of the Data Export window to perform the following tasks:

- Specifying the SPECTRUM events data to include in the export
  See *Specifying Events Data* on Page 3-10.

- Specifying the SPECTRUM statistics data to include in the export
  See *Specifying Statistics Data* on Page 3-15.
- Specifying the output parameters for both types of historical data
  See *Specifying Output Parameters* on Page 3-18.

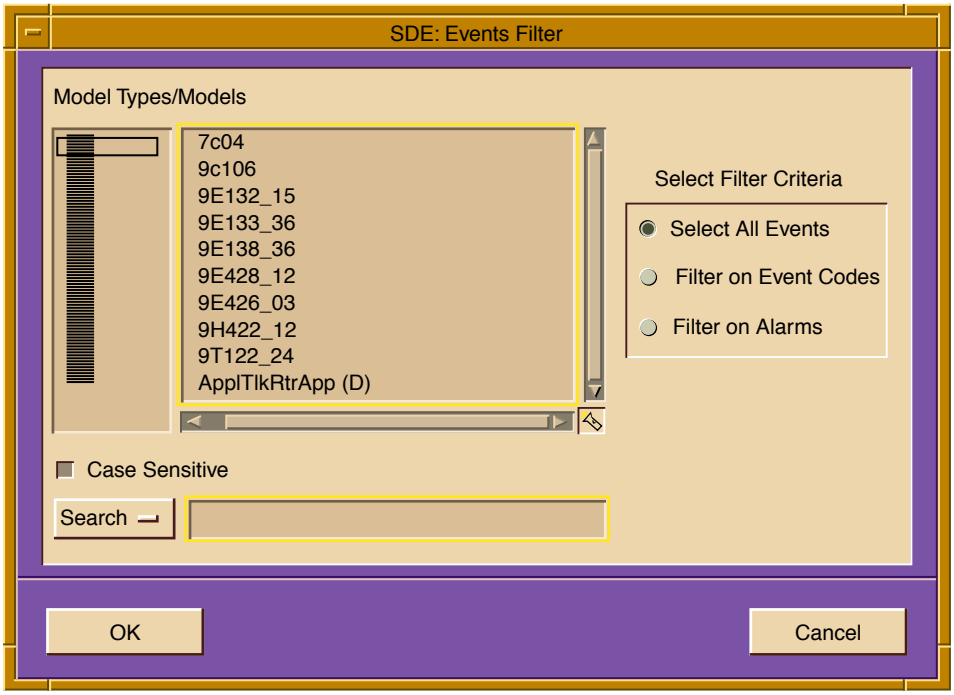
Specifying Events Data

You use the Events Filter dialog box (Figure 3-7) to define events data for an export.

To open the dialog box:

Click the **Events...** button in the Historical Data section (Figure 2-4) of the Data Export window.

Figure 3-7. Events Filter Dialog Box



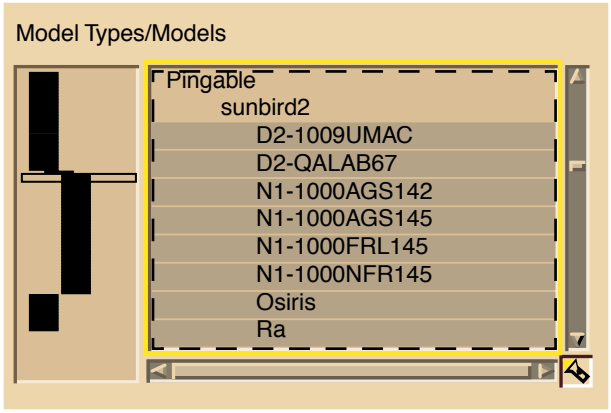
NOTE

In the Events Filter dialog box (Figure 3-7) and the Statistics Filter dialog box (Figure 3-12), model names followed by a (D) indicate models that have been deleted from the SPECTRUM modeling database. They will be visible only to users with Admin 0 privileges for as long as statistics and events data for those models exist.

Specifying Models

This section describes how to specify the models for which you want to export events data. You select models from the Model Types/Models list (Figure 3-8) in the Events Filter dialog box.

Figure 3-8. Model Types/Models List from the Events Filter Dialog Box



Locating Model Types From the Model Types/Models List

You can either manually scroll through the list to find the model types you want or use the Search and Filter utilities to find them. See Figure 3-8.

To find a name manually:

Use the scroll bar adjoining the list, or use the "sliding window" on the list indicator located to the left of the list.

To use the Search utility to find a name:

Toggle the **Search/Filter** button, if necessary, to the (default) **Search** option. Start typing the model type name in the adjacent text-entry field. As soon as Search finds a match for the name the Model Types/Models list automatically scrolls so that the name you are seeking appears at the top of the list.

To use the Filter utility to find a name:

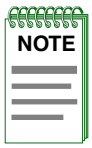
Toggle the **Search/Filter** button to the **Filter** option. Start typing any of the letters in the model type name in the adjoining field. As soon as Filter matches the letters you entered with letters included in model type names in the list, those names only appear in the list. For example, if you type "erne," the list displays model type names that include the letter string, such as the "EthernetApp" and EthernetIfApp."

By default, the **Search** and **Filter** operations are case sensitive. To specify a case insensitive operation, click on the **Case Sensitive** button to deselect the option.

Also by default, the **Search** and **Filter** operations are enabled when you open the Events Filter dialog box, as indicated by the selected "flashlight" icon located in the lower right-hand corner of the Model Types/Models list and the yellow box around the list and the text-entry field next to the **Search/Filter** button. Deselect the "flashlight" icon if you want to disable **Search** and **Filter** operations.

Selecting Models

The Events Filter dialog box enables you to select as many or as few models as you want from any number of preferred landscapes.



If you previously selected the **Automatically Expand Preferred Landscapes** option (see *Specifying Landscapes* on Page 3-5), the dialog box lists for each preferred landscape all models related to the model type name you selected from the Model Types/Models list. If you deselected the option, only the landscape names appear, and you must double-click on each landscape name to display the list of models included in it.

To select all models belonging to a particular model type:

1. Double-click on a model type name.
2. Click once again on the model type name.

   A double asterisk (**) appears in front of the model type name and all landscape names listed under the model type name, indicating that all related models from all preferred landscapes have been selected.

   To deselect the models, click on the model type name again. To deselect models for a specific landscape only, click on the landscape name.

To select specific models:

1. Double-click on a model type name.
2. Click on each model you want to select.

   To deselect a model, click again on the model name.

Selecting Filter Criteria

This section describes how to specify the types of SPECTRUM events and alarms data you want to export for the models you have selected. The Select Filter Criteria list includes three filtering options:

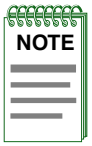
- Select All Events — All events and alarms for the selected models are exported. This is the default setting.
- Filter on Event Codes — Only the events that match the codes you select are for the selected models are exported.
- Filter on Alarms — Only alarms of the severity level you specify for the selected models are exported.

Selecting Event Codes

Event Codes are the numeric strings mapped to SPECTRUM events. By specifying event codes you specify the event information you want to export for the models you have selected.

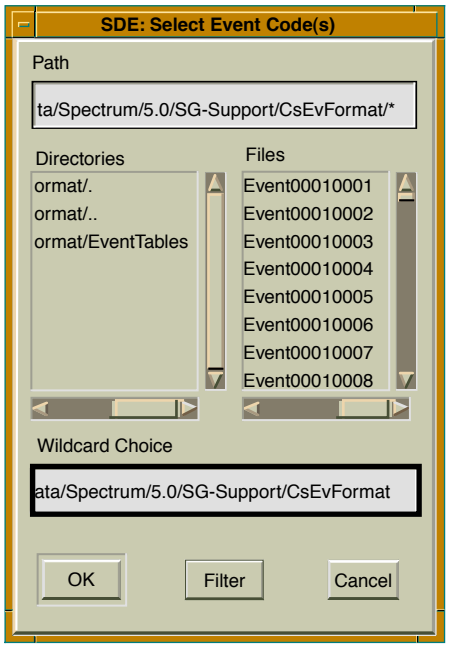
To select the event codes:

1. Select the **Filter on Event Codes** button from the Select Filter Criteria list in the Events Filter dialog box (Figure 3-7). The **Select Event Code(s)** dialog box (Figure 3-9) appears.
2. Select the event codes you want from the **Files** list by clicking on them, and then click on the **OK** button to return to the Events Filter dialog box.



Although you can specify an alternative directory from which event codes can be selected, it is important that this directory's structure has been set up correctly. For example, if any of the event codes contain an alarm condition, an `EventTables` subdirectory containing a Condition file is required in order to properly expand the event message. See the existing structure of the `. . ./SG-Support/CsEvFormat` directory for more information, and the SPECTRUM manual, ***Modeling with the GnSNMPDev Toolkit***, for information on event processing.

Figure 3-9. Select Event Code(s) Dialog Box



Selecting Alarms

Alarm condition color codes indicate the severity of alarms set by SPECTRUM for network models. By specifying alarm codes (Red, Yellow, etc.) you specify the alarm information you want to export for the models you have selected.

To select alarms:

1. Select the **Filter on Alarms** buttons from the Select Filter Criteria list in the Events Filter dialog box (Figure 3-7).

   The Alarm Filter Options dialog box shown in Figure 3-10 appears. This list contains all possible Alarm Conditions that can occur for a device. You can either select all alarms or one or more specific alarms.

2. Select the alarm codes you want, and then click on the **OK** button to return to the Events Filter dialog box.

Figure 3-10. Alarm Filter Options Dialog Box

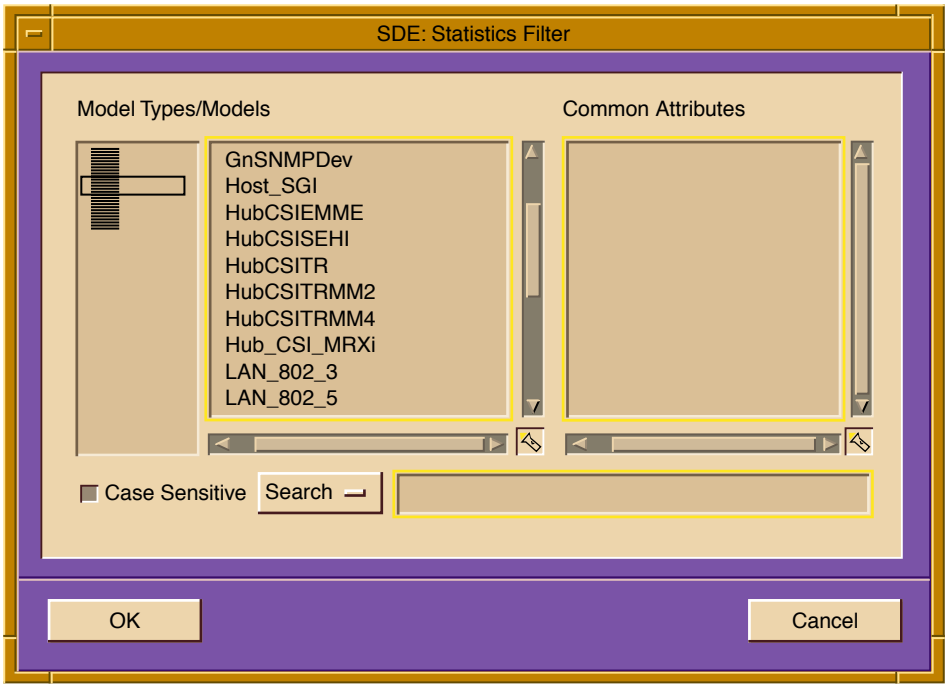
Specifying Statistics Data

You use the Statistics Filter dialog box (Figure 3-11) to define statistics data for an export.

To open the Statistics Filter dialog box:

Click the **Statistics...** button in the Historical Data section (Figure 2-4) of the Data Export window.

Figure 3-11. Statistics Filter Dialog Box



Specifying Models and Model Attributes

This section describes how to specify the models for which you want to export statistics data. You select models from the Model Types/Models list (Figure 3-12) in the Statistics Filter dialog box.

Use the same procedures for selecting models as described in *Specifying Models* on Page 3-11 in the *Specifying Events Data* section.

To select model attributes:

1. Select the attributes for which you want statistics from the Common Attributes list.

   This list contains the attributes common to all the models you have selected. You can select as many attributes as you want from the list, but you must select at least one.

   An attribute name with a [ ] after it indicates that the attribute is a list attribute. A list attribute contains a set or sequence of values and is stored in a MIB table. See the ***SPECTRUM Model Type Editor User Guide*** for more information.

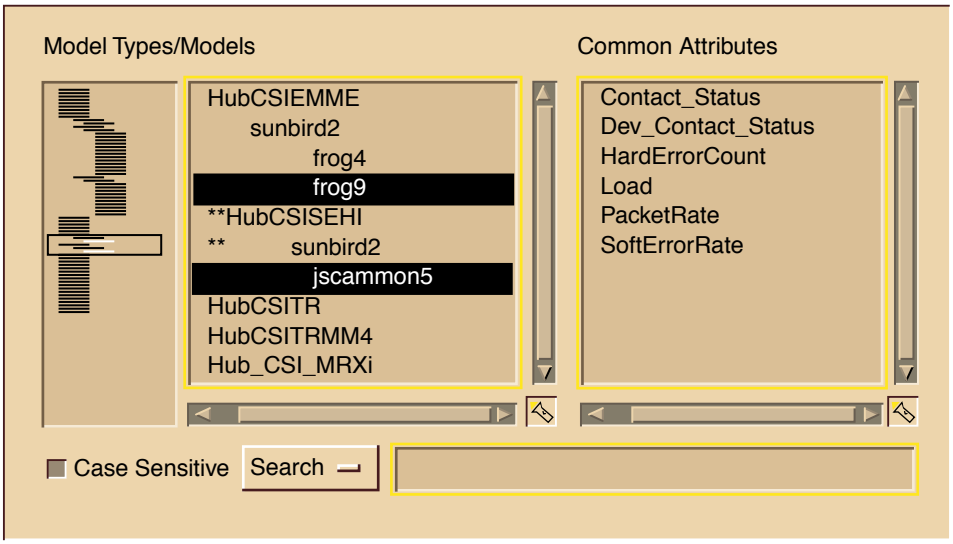
When you choose a list attribute, the output format of the expected data will be in a format compatible with attributes of this type. See Appendix A, Appendix B, and Appendix C for information on how standard statistics output and list attribute statistics output differ. You can specify that all statistics output be formatted in the list attribute format by changing the value of the `ListAttrFormat` parameter in the `SDE` resource file. See Appendix D for information on the `SDE` resource file.

If you have not specified list attribute format in the `SDE` resource file, a dialog box warning you of output file format change will appear *under the following circumstances*:

- If you selected a list attribute when none had been selected before. In this case, the resulting output file will be in list attribute format.
- If you deselected all list attributes that had previously been chosen in the definition file. In this case, the resulting output file will be in standard format.

2. Click **OK** to close the dialog box, or click **Cancel** to dismiss the operation.

Figure 3-12. Model Types/Models and Common Attribute Lists from the Statistics Filter Dialog Box



Specifying Output Parameters

This section describes how to specify the following output parameters for events or statistics data or both:

- Output file, data set, or table name
- Output mode (overwrite or append data to an existing file, data set, table, or create a new file, data set, or table)
- Export Range (time period from which data was extracted)

Specifying an Output File/Data Set/Table Name

This section describes how to specify a name for the **Output File/Data Set/Table** field. If you choose instead, however, to accept the default file, data set, or table displayed in the field and have already saved data to it, you must specify whether you want Data Export to overwrite or append data to the existing data (see *Specifying an Output Mode* on Page 3-18).

You can also change the default file, data set, or table names by modifying the value for the `EventsName` parameter for events and the `StatsName` parameter for statistics in the Data Export `SDE` resource file (see Appendix D).

To specify an output file name:

Modify or overwrite the default output file, data set, or table name.

Specifying an Output Mode

This section describes how to use **Output Mode** button options to specify how you want to save data to a events or statistics file, data set, or table.

To specify an output mode:

Select one of the following options from the **Output Mode** button.

Append	The extracted data is appended to the output file, data set, or table.
Overwrite	The extracted data overwrites the data stored in the file, data set, or table.
Date	(For ASCII only.) The extracted data is stored in a new file whose name is created by concatenating the date and time to the name you specified in the **Output File** field.

Specifying an Export Range

This section describes how to use the **Export Range** button to specify the time period from which you want to export events or statistics data.

To specify an export range:

Select one of the following options from the **Export Range** button.

Custom — Data Export exports data from the specified start date and time to the specified end date and time. (See *Specifying a Custom Data Range* on Page 3-19.)

Day — Data Export exports data from the calendar day (00:00:00 to 23:59:59) before the date of execution. For example, if Data Export is executed on May 21, data from the Events database from May 20 at 00:00:00 to 23:59:59 is exported.

Week — Data Export exports data from the seven calendar days before the date of execution — from 00:00:00 of the first day to 23:59:59 of the last day. For example, if Data Export is executed on Wednesday, May 21, 1997, data is exported from Wednesday, May 14 at 00:00:00 to Tuesday, May 20 at 23:59:59.

Month — Data Export exports data from the calendar month before the date of execution — from the first day of the month at 00:00:00 to the last day of the month at 23:59:59. For example, if Data Export is executed on May 21, data will be exported from April 1 at 00:00:00 to April 30 at 23:59:59.

Specifying a Custom Data Range

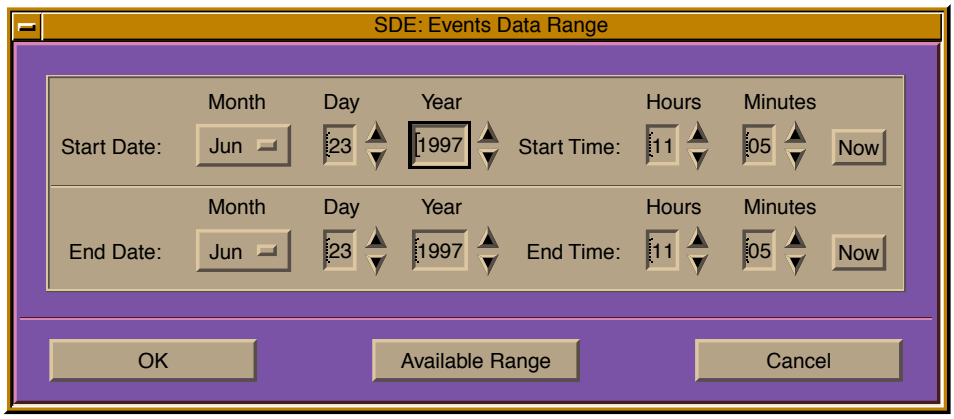
If you select **Custom**, the Data Range dialog box in Figure 3-13 appears. (The dialog box is the same for Events or Statistics.)

To set a custom range for the definition file:

1. Click on the **Available Range** button to see what range of data exists.

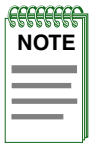
   The range values appear in the **Start Date** and **End Date** fields after Data Export examines the SPECTRUM events or statistics database to determine the available range.

Figure 3-13. Events/Statistics Data Range Dialog Box



2. Specify the **Start Date** and **End Date**:
   - Use each **Month** button to select the start and end months.
   - Use the ▲ or ▼ buttons for the **Day** and **Year** fields to set the day and year for the start and end dates.
3. Specify the **Start Time** and **End Time**:
   - Use the ▲ or ▼ buttons next to the **Hours** and **Minutes** fields to set start and end times.
   - Click the **Now** button sets the date and time settings to the current date and time.

Use the **Now** button to set either the start or end range specification to the current date and time.



If you attempt to save a definition file with a export range for events that differs from the export range for statistics, Data Export displays a courtesy message notifying you of this non-critical discrepancy. For example, Data Export displays the message if you attempt to save the export range as day for Events but week for Statistics. There is no requirement that export ranges must agree.

4. Click the **OK** button to save the settings and return to the Data Export window.

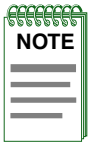
Setting Current Data Parameters

To specify current data:

1. Select the Data Type you want to export — **Model Types**, **Model Type Hierarchy**, **Models**, **Attributes**, **Associations**, **Relations**, **Rules**, and **Extended Attributes**.

   You can select as many data types as you want for a single definition file. Notice that a default file name, data set name, or table name is provided for each data type.

2. Accept the default output name, as specified in the `SDE` resource file, for each data type selected, or specify another in the current file by modifying or overwriting the name in the output field.



Each name must be unique because Data Export stores each data type in a separate file, table, or data set.

Chapter 4

Exporting Data

Describes how to immediately start a data export and how to schedule an export with the Scheduler utility; discusses NT scheduling requirements; describes the output produced from ASCII, SAS, and SQL data exports.

Overview

This chapter describes the two methods available from the Data Export window (Figure 2-2) for starting an export:

- Using the **Export Now** command to start an export
  See *Starting an Export Now* on Page 4-2.
- Using the **Schedule Export** command to invoke the scheduler utility that you can use to schedule an export
  See *Scheduling an Export* on Page 4-2.

  If you are unfamiliar with the Data Export window, see Chapter 2.

This chapter also describes:

- Prerequisites for using the Schedule Service utility on NT systems
  See *Special Scheduler Requirements for NT* on Page 4-7.
- Sample export output
  See *Checking Export Output* on Page 4-7.

Starting an Export Now

You can export data immediately with the **Export Now** command once you have created and saved a definition file (see Chapter 3) for the export.

To start an export:

1. Open a definition file in the Data Export window.
2. Click on the **Export Now** icon, or select **Export Now** from the File menu to start the export.

Scheduling an Export

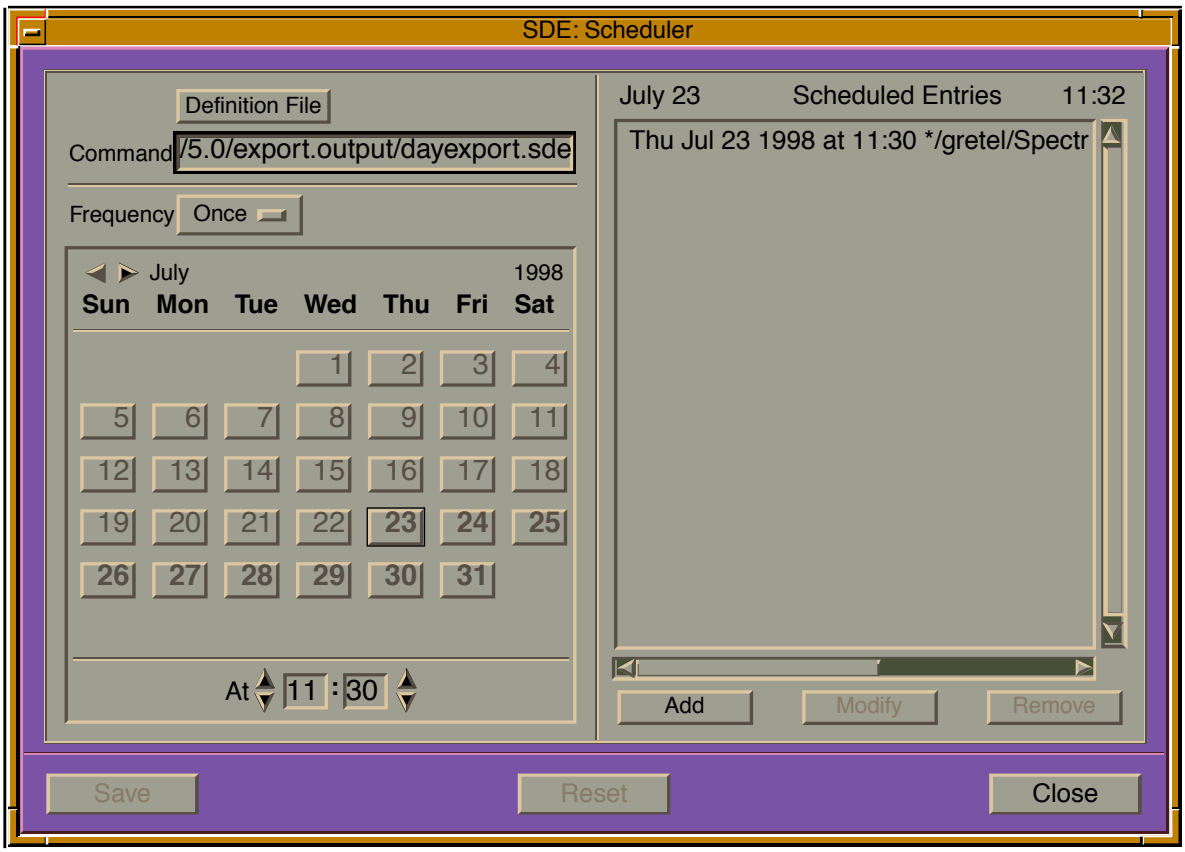
The Scheduler option enables you to schedule an export at off-peak times, when bandwidth or system resources or both are more available. For information on creating a definition file (see Chapter 3).

To schedule an export:

1. Open a definition file in the Data Export window.
2. Click on the **Schedule Export** icon, or select **Schedule Export** from the **File** menu.

   The Scheduler window (Figure 4-1) opens. The Scheduler's **Command** field displays the path for the definition file opened in the Data Export window when you invoked the Scheduler.

Figure 4-1. Scheduler Window



3. Specify the scheduled export in the Scheduler window.

   See *Working with the Scheduler* on Page 4-3 for details about working with the Scheduler window.

Working with the Scheduler

The Scheduler window enables you to configure export commands and include them in a scheduled command queue on your system. The commands are executed by the cron utility on UNIX systems and the Schedule Service on NT systems (see *Special Scheduler Requirements for NT* on Page 4-7 for more information).

The window enables you to perform the following tasks:

- Create and include in a scheduled queue export commands that specify the definition file for each export and when and how often you want the data export to occur
  See *Creating Scheduled Export Commands* on Page 4-4.
- Change scheduled export command parameters
  See *Modifying Scheduled Export Commands* on Page 4-6.
- Delete scheduled export commands
  See *Removing Scheduled Export Commands* on Page 4-7.

Creating Scheduled Export Commands

To create a scheduled export command:

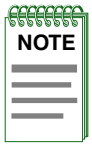
1. Accept the definition file listed in the **Command** field (the file opened in the Data Export window when you invoked the Scheduler), or specify another definition file for the scheduled export.

   To specify another definition file, click the **Definition File** button to open a file selection dialog box, where you can select a definition file. The **Command** field displays the path for the definition file you selected.

2. Specify the export frequency (when and how often you want the export executed).

   Select one of the following frequency options (Figure 4-2) from the **Frequency** toggle button:

   - **Once** — Lets you specify the date and time for a single export.
   - **Daily —** Lets you specify the time for a daily export.
   - **Weekly —** Lets you specify the day and time for a weekly export.
   - **Monthly —** Lets you specify the date and time for a monthly export.



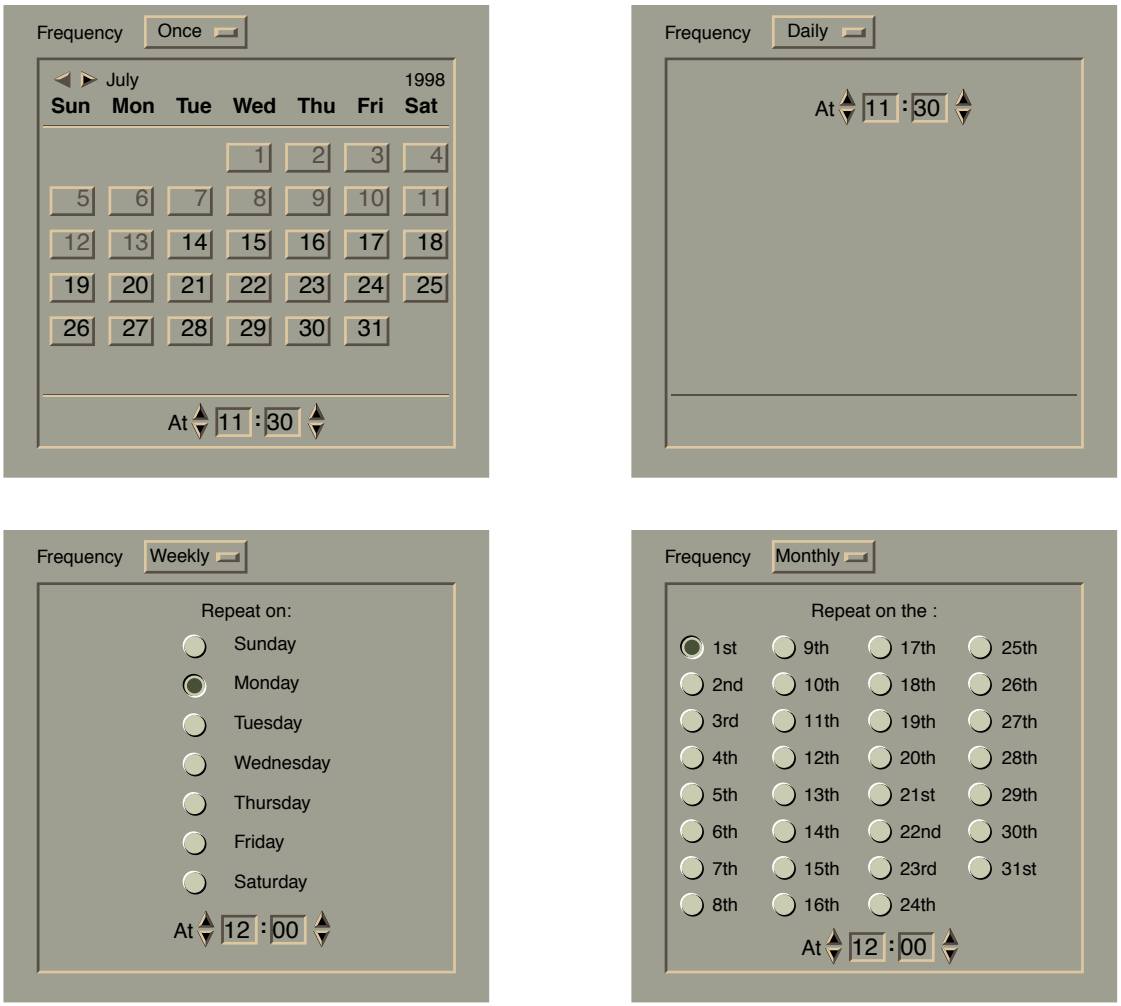
When exporting events or statistics data or both on a periodic scheduled basis, the export range specified in the definition file should correspond to the selected schedule frequency option (Daily, Weekly, Monthly). See *Setting Historical Data Parameters* on Page 3-9 for information on specifying events and statistics data.

3. Add and save the scheduled export command entry to the **Scheduled Entries** list.

Click the **Add** button to include the entry in the list. Then click the **Save** button to save the entry to the scheduled queue before you exit the Scheduler. Repeat these procedures for subsequent entries. If you exit without saving, your command entries *will not* be executed.

See *Describing Scheduled Export Command Entries* on Page 4-6 for additional information.

Figure 4-2. Scheduled Export Frequency Options



Describing Scheduled Export Command Entries

A scheduled export command entry in the **Scheduled Entries** list consists of two parts: the scheduling information, which indicates when the command will be executed, followed by the command, which is enclosed in quotation marks.

Example command entries with available frequency options are listed as follows:

Once frequency option entry

```
Tue Jul 28 1998 at 08:52 "/gretel/Spectrum/5.0/SG-Tools/dtxscript
/gretel/Spectrum/5.0/export.output/example_definitionfile.sde"
```

Daily frequency option entry

```
Daily at 23:00 "/gretel/Spectrum/5.0/SG-Tools/dtxscript
/gretel/Spectrum/5.0/export.output/example_definitionfile.sde"
```

Weekly frequency option entry

```
Weekly on Monday at 06:00 "/gretel/Spectrum/5.0/SG-Tools/dtxscript
/gretel/Spectrum/5.0/export.output/example_definitionfile.sde"
```

Monthly frequency option entry

```
Monthly on the 1st at 01:00 "/gretel/Spectrum/5.0/SG-Tools/dtxscript
/gretel/Spectrum/5.0/export.output/example_definitionfile.sde"
```

Modifying Scheduled Export Commands

The Scheduler enables you to change the definition file or frequency option or both for a scheduled export command entry in the **Scheduled Entries** list before or after you have saved it to the scheduled queue.

To modify an entry:

1. Highlight the entry you want to change in the **Scheduled Entries** list.
2. Change the entry by selecting another frequency option or definition file or both (as described in *Creating Scheduled Export Commands* on Page 4-4).
3. Click the **Modify** button.

   The modified entry replaces the former entry in the **Scheduled Entries** list.
4. Click the **Save** button.

   You will lose your changes if you exit the Scheduler without saving.

Removing Scheduled Export Commands

The Scheduler enables you to remove an entry from the **Scheduled Entries** list before or after you have saved it to the scheduled queue.

To remove all entries you have added to the list but not saved to the scheduled queue:

Click the **Reset** button.

To remove a single entry you have added to the list but not saved to the scheduled queue:

Highlight the entry and click the **Remove** button.

To remove a single entry you have saved to the scheduled queue:

Click the **Remove** button and then click the **Save** button. If you exit without saving, the entry will not be removed.

Special Scheduler Requirements for NT

This section discusses NT Schedule Service requirements:

- The NT Schedule Service must be running in order for the Scheduler to function.

  Make sure the Startup Type of the Schedule Service is set to "Automatic" so that the Schedule Service is started automatically whenever the computer is restarted.

- The Schedule Service must also log on with the proper User Account.

  Be sure to specify that the Schedule Service logs on as a member of either the Administrator's group or the Backup Operator's group. (Do not specify the System Account—it cannot access the network.)

  Then make sure the user or user group assigned to the Schedule Service is also defined as a SPECTRUM user in SpectroGRAPH.

If you find that the Scheduler is not performing exports as scheduled, check the NT Schedule Service Startup parameters. It is important to note that when the Schedule Service parameters are incorrect, you *can* schedule exports. The Scheduler, however, will not be able to perform the export.

Checking Export Output

This section describes output that Data Export writes to the output directory for ASCII, SQL, and SAS data. You can examine an the contents of an export output directory to determine if data was successfully extracted from SPECTRUM databases.

Log File

Data Export writes a log file (Figure 4-3) for each export to the export output directory. The log file provides information about the export. It indicates whether or not Data Export was able to export the data you want from the landscapes you specified in the definition file, the date and the elapsed time for the export, and any other event notification related to the export. For subsequent exports that use the same definition file, Data Export appends information to the existing log file.

The log file name is derived from the name of the definition file for the export, and it is assigned the `.log` extension. For example, an export using the definition file `eventsdata.sde` produces a log file with the name `eventsdata.log`.

Figure 4-3. Sample Log File

```
% more sampleDeffile.log
*******************************************************************************

Jul 31 08:45:15 Description: Sample Export Definition File
                SpectroSERVERs: depot 0x3e00000

Jul 31 08:45:17 Begin Model-Types export to modtyp
Jul 31 08:45:22 End Model-Types export

Jul 31 08:45:22 Begin Models export to model
Jul 31 08:54:13 End Models export

Jul 31 08:54:13 Begin Attributes export to attr
Jul 31 09:19:23 End Attributes export

Jul 31 09:19:23 Begin Ext-Attributes export to extattr
Jul 31 09:45:27 End Ext-Attributes export

Jul 31 09:45:27 Begin Events export to event
Jul 31 09:45:27 Events data from Mon Jul 20 09:17:00 1998
                to Fri Jul 31 08:12:00 1998 are being searched
Jul 31 09:45:52 End Events export

Jul 31 09:45:52 Begin Statistics export to stat
Jul 31 09:45:52 Statistics data from Mon Jul 20 09:18:00 1998
                to Fri Jul 31 08:38:00 1998 are being searched
Jul 31 09:46:11 End Statistics export

Jul 31 09:46:11 Begin Relations export to relation
Jul 31 09:46:11 End Relations export
```

Output Files, Data Sets, and Tables

This section describes the types of output for the data formats supported by Data Export.

Sample ASCII Output

An export using a definition file, which specifies that all current data and statistics and events data should be exported, will produce the following output files in the output directory:

- `modtyp`
- `modtyp.sch`
- `assoc`
- `assoc.sch`
- `mthier`
- `mthier.sch`
- `relation`
- `relation.sch`
- `event`
- `event.sch`
- `stat`
- `stat.sch`
- `model`
- `model.sch`
- `rules`
- `rules.sch`
- `attr`
- `attr.sch`
- `extattr`
- `extattr.sch`
- `allcurrent.log`

This output consists of the data files for the data types you specified in the definition file along with their corresponding schema files (the `.sch` files). A schema files defines the structure of the data. See *Setting ASCII Format Options* on Page 3-7 for information on how to specify whether to include a schema in each related data file or create separate schema files.

Sample SQL Output

In addition to data tables, schema files, and the export log file, SQL output also includes the following files:

- `ingresExport.sprm`
- `ingresExport_import.log`

The `.sprm` file includes information about temporary ASCII-formatted files used by the Data Export scripts, `SDEIngImport`, `SDEOraImport`, and `SDESybImport`, to import data tables to an SQL database See Appendix E for more information. The `_import.log` file lists the commands executed to import the temporary ASCII-formatted files into a database table. This file may also list informational or event messages.

Sample SAS Output

SAS output includes data sets and their related data indexes and import information:

- `relation.snx01`
- `relation.ssd01`
- `sasExport.log`
- `impoinfo.snx01`
- `impoinfo.ssd01`

An `.snx01` file is an index for a corresponding `.ssd01` data set. The `impoinfo` file includes information about the imported data sets.

Chapter 5

SAS Exports

Provides information about SAS export requirements and considerations.

Configuring the dtxscript File

To export to SAS data sets, you must configure the `dtxscript` file, which is located in the `.../Spectrum/SG-Tools` directory.

Modify the script's "Necessary SAS additions" section as follows:

- The `SASROOT` variable must be uncommented (remove the # character). Add the complete path of the SAS root directory to the right of the = sign.
- The `export SASROOT` command must be uncommented.
- The `PATH` variable must be uncommented.
- The `export PATH` command must be uncommented.
- If you want Models exports to display more than the first 32 characters of model names, you must change the value of the `SDE_OUTPUT_MODEL_LEN` variable. For SAS, you can specify display of up to 200 characters.

When this script is executed, the `SASROOT` environment variable is exported and `/etc` is added to the user's `PATH` environment variable.

Minimum Requirements for Exports to SAS Data Sets

To export SPECTRUM data to SAS data sets, the SAS core components must be installed and executable from the machine from which the export is run. This does not imply that the SAS core components must actually reside on the machine itself, merely that they be executable from that machine.

SAS Export Errors

There are several indicators that may arise during an export which point to incomplete SAS exports or other SAS-related problems. The following sections discuss these indicators and suggest some solutions.

Leftover Pipes

On the Solaris platform, the export process uses UNIX-named pipes to send SAS source code and data to the child process running SAS. These pipes are zero-length files created in the output directory, with names that are a combination of the literal 'ctron', the type of export, and the child process id (e.g., `ctronmt_1234`, `ctronsta_4543`, and `ctroneve_35875`).

These pipes are removed when a successful export is completed, and under most error conditions. Situations may arise, however, when they are not removed. Leftover pipes indicate an unsuccessful export. Output data should be examined, as well as the log file, for indications of errors (see *Checking Export Output* on Page 4-7).

Leftover Lock Files

With the release of SAS 6.09, the default for the system option `FILELOCKS` is `FAIL` (The default for SAS 6.07 is `NONE`). Thus, when a data set is opened for output, a lock is placed on the data set. This shows up as a file with an '`.lck`' extension on the data set name. If, after an export, one or more `.lck` files exists, one or more of the exports was incomplete. As with leftover pipes, you should check the output data set(s) and any log files created to determine where the problem arose (see *Checking Export Output* on Page 4-7 and *SAS Log Files* on Page 5-3). The lock file(s) should be removed and the export rerun.

Leftover SAS Processes

When an export fails, it is possible that a child process running SAS still remains in the background. This process should be killed and the output data set(s) and the log file(s) should be examined for completeness (see *Checking Export Output* on Page 4-7 and *SAS Log Files* on Page 5-3).

Incomplete impoinfo File Update

If two or more exports are running concurrently, it is possible but unlikely, that they will attempt to write to the `impoinfo` data set at the same time. If this should happen, only one export process will obtain the write lock on the `impoinfo` data set and be able to update it. The other process will not get a lock, and will not update the file. There are no indicators of this problem (e.g., error messages) unless you create a SAS log file and examine it for error messages (see *SAS Log Files* on Page 5-3).

The solution to this problem is to run multiple exports in succession rather than concurrently. See SAS reference material on the `FILELOCKS` system option in the UNIX environment.

SAS Log Files

If examination of data sets and export log files does not indicate the source of an export problem, you can create a SAS log file by setting the environment variable, `SASLOGFILE`, to the full path of the desired SAS log file prior to executing SDE. When SDE executes SAS, it will write the results of the export, including error messages, to that file. The resulting log file can then be checked for error messages, etc. (This mechanism works for exports executed with the **Export Now** command only.)

It should be noted that while the `SASLOGFILE` environment variable is set, the Data Export SAS process will continue to append runtime information to it. The resulting file can become large.

SAS Work Area

If the SAS work area (e.g., `/tmp`) becomes so full that SAS cannot allocate adequate space, it is possible that the child process running SAS will hang without any messages or indications of the problem. Under this circumstance, the `dataexp` task will also hang, while waiting for the child process running SAS to exit. Therefore, it will be necessary to cancel the `dataexp` task and clean up any temporary files left over.

If you suspect that this is the case, check the SAS work area and delete any temporary non-essential files. It may also be desirable to change the work directory specified in the `config.sas609` file to an area with more available space. Once there is adequate work space, this problem should not occur again.

SAS Exports on the NT Platform

When a SAS export is executed on the NT platform, an informational dialog box appears on the screen at the start of the export. During the export, an icon appears in a corner of the screen; also, a temporary file containing SAS source code is created in the output directory. When the export completes, the icon disappears from the screen and the temporary files are deleted. If any temporary files remain in the output directory after the export completes, an error occurred during the export. In this case, you should check the log file to determine the cause.

Chapter 6

Ingres Exports

Provides information about Ingres export requirements and considerations.

Configuring the dtxscript File

To export to Ingres tables, you must configure the `dtxscript` file, which is located in the `.../Spectrum/SG-Tools` directory.

Modify the script's "Necessary Ingres additions" section as follows:

- The `II_SYSTEM` variable must be uncommented (remove the # character). Add the complete path of the Ingres root directory to the right of the = sign.
- The `export II_SYSTEM` command must be uncommented.
- The `PATH` variable must be uncommented.
- The `export PATH` command must be uncommented.
- If you want Models exports to display more than the first 32 characters of model names, you must change the value of the `SDE_OUTPUT_MODEL_LEN` variable. For Ingres, you can specify display of up to 1024 characters.

When this script is executed, the `II_SYSTEM` environment variable is exported and the Ingres bin and utility areas are added to the user's `PATH` environment variable.

SQL Error Recognition During Ingres Database Imports

When you export to Ingres, initially an export to ASCII is performed. Next, a series of SQL commands is generated to create tables, copy data and add indices. The commands are executed and a log of the execution is stored in <deffile>_import.log (where <deffile> is the name of the definition file). This log file is searched for errors. If any errors are found, they are placed in the <deffile>.log file and the following message is displayed:

```
"Ingres completed with possible errors detected. Examine
<deffile>_import.log file for actual errors."
```

See *Checking Export Output* on Page 4-7 for more information.

Loading and Accessing Ingres Tables

Data Export uses the Ingres **copy** statement to load database tables. Refer to your Ingres documentation for restrictions and recommendations about the **copy** statement.

You should be aware of any restrictions imposed by the Ingres Database Management System, such as reserved words and naming conventions. See the appropriate Ingres manuals for information.

Chapter 7

Sybase Exports

Provides information about Sybase export requirements and considerations.

Configuring the dtxscript File

To export to Sybase tables, you must configure the `dtxscript` file, which is located in the `.../Spectrum/SG-Tools` directory.

Modify the script's "Necessary Sybase additions" section as follows:

- The `SYBASE` variable must be uncommented (remove the # character). Add the complete path of the Sybase root directory to the right of the = sign.
- The `DSQUERY` variable must be uncommented. Add the name of the Sybase server to the right of the = sign.
- The `export SYBASE` and `export DSQUERY` commands must be uncommented.
- The `PATH` variable must be uncommented.
- The export `PATH` command must be uncommented.
- If you want Models exports to display more than the first 32 characters of model names, you must change the value of the `SDE_OUTPUT_MODEL_LEN` variable. For Sybase, you can specify display of up to 255 characters.

When this script executes, the `SYBASE` and `DSQUERY` environment variables are exported and the Sybase bin area is added to the user's `PATH` environment variable.

SQL Error Recognition During Sybase Database Imports

When you export to Sybase, initially an export to ASCII is performed. Next, a series of SQL commands is generated to create tables, copy data and add indices. The commands are executed and a log of the execution is stored in <deffile>_import.log (where <deffile> is the name of the definition file). This log file is searched for errors. If any errors are found, they are placed in the <deffile>.log file and the following message is displayed:

```
"Sybase completed with possible errors detected. Examine
<deffile>_import.log file for actual errors."
```

See *Checking Export Output* on Page 4-7 for more information.

Loading and Accessing Sybase Tables

Data Export uses its own Sybase user ID to create and load your Sybase tables. This user ID must be added (via **sp_addlogin**) by your database administrator. The Sybase account must be created with a user ID of **spectrum** and a password of **cabletron**. The **spectrum** user ID must own the database into which data is imported or have create table permission. The following is the syntax for the **sp_addlogin** command:

```
sp_addlogin spectrum, cabletron, <db_name>, null, "Spectrum Data Export"
```

To keep other data secure, it is recommended that your database administrator revoke privileges to the **spectrum** user ID for any non-SPECTRUM data.

After you run Data Export, the **spectrum** user ID owns the newly created tables. Your database administrator should use the Sybase **grant** command to allow access to the tables.

Data Export uses the Sybase **bcp** utility to load database tables. To use the **bcp** utility, the Sybase option **select into/bulkcopy** must be set on. See your database administrator to make sure database options are set correctly. See your Sybase documentation for other restrictions and recommendations about the **bcp** utility.

You should be aware of any restrictions imposed by the Sybase Database Management System, such as reserved words and naming conventions. See the appropriate Sybase manuals for information.

Chapter 8

Oracle Exports

Provides information about Oracle export requirements and considerations.

Configuring the dtxscript File

To export to Oracle tables, you must configure the `dtxscript` file, which is located in the `.../Spectrum/SG-Tools` directory.

Modify the script's "Necessary Oracle additions" section as follows:

- The `ORACLE_HOME` variable must be uncommented (remove the # character). Add the complete path of the Oracle root directory to the right of the = sign.
- On UNIX platforms only, the `ORACLE_SID` variable must be uncommented. Add the name of the Oracle server to the right of the = sign. The Oracle server name (also called the Oracle System Identifier) is normally four alphanumeric characters.
- The export `ORACLE_HOME` and export `ORACLE_SID` commands must be uncommented.
- The `PATH` variable must be uncommented.
- The `export PATH` command must be uncommented.
- The `CONNECTSTRING` variable must be uncommented. Add the database name or database alias to the right of the = sign.
- On the NT platform only, the `ORAPLUS_VER` variable must be uncommented. Add the version number of Oracle SQL*Plus to the right of the = sign. Only the first two digits are required, and they must be enclosed in quotes. For example, the variable line for SQL*Plus version number 3.1.3.5.4 should read `ORAPLUS_VER="3.1"`.

- On the NT platform only, the ORALOAD_VER variable must be uncommented. Add the version number of Oracle SQL*Loader to the right of the = sign. Only the first two digits are required, and they must be enclosed in quotes. For example, the variable line for SQL*Loader version number 7.1.4.0.0 should read ORALOAD_VER="7.1".
- If you want Models exports to display more than the first 32 characters of model names, you must change the value of the SDE_OUTPUT_MODEL_LEN variable. For Oracle, you can specify display of up to 1024 characters.

When this script executes, the Oracle environment variables are exported and the Oracle bin area is added to the user's PATH environment variable.

SQL Error Recognition During Oracle Database Imports

When you export to Oracle, initially an export to ASCII is performed. Next, a series of SQL commands is generated to create tables, copy data, and add indices. The commands are executed and a log of the execution is stored in <deffile>_import.log (where <deffile> is the name of the definition file). This log file is searched for errors. If any errors are found, they are placed in the <deffile>.log file and the following message is displayed:

```
"Oracle completed with possible errors detected. Examine
<deffile>_import.log file for actual errors."
```

See *Checking Export Output* on Page 4-7 for more information.

Loading and Accessing Oracle Tables

Data Export uses its own Oracle user ID to create and load your Oracle tables. This user ID must be added by your database administrator. The Oracle account must be created with a user ID of **spectrum** and a password of **cabletron**. The following is the syntax for the **create user** command:

```
create user spectrum identified by cabletron
```

The **spectrum** user ID must own the database into which data is imported. In addition, the **spectrum** user ID must have the **create session** and **create table** system privileges.

To keep other data secure, it is recommended that your database administrator revoke privileges to the **spectrum** user ID for any non-SPECTRUM data.

After you run Data Export, the **spectrum** user ID owns the newly created tables. Your database administrator should use the Oracle **grant** command to allow access to the tables.

Data Export uses the Oracle **SQL*Loader** utility to load database tables. Refer to your Oracle documentation for other restrictions and recommendations about the **SQL*Loader** utility.

You should be aware of any restrictions imposed by the Oracle Database Management System, such as reserved words and naming conventions. See the appropriate Oracle manuals for information.

Installation Considerations

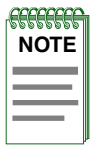
In order to perform Oracle exports:

- SpectroGRAPH must be installed on the Oracle Server machine. This is because **SQL*Loader** is currently bundled with the Oracle Server software. (This restriction may be removed in the future if Oracle licensing and bundling policies change.)
- The direct path connection between the Oracle Server and the Oracle Client must be homogeneous.
- If you are exporting over SQL-Net, the two machines involved must be running the same hardware and operating system platforms to use Direct Load. If the two machines are not homogeneous, Conventional Load should be used.

Chapter 9

Microsoft SQL Server Exports (NT)

Provides information about Microsoft SQL Server export requirements.



Microsoft SQL Server is available as on output format option on the NT platform only.

Configuring the dtxscript File

To export to Microsoft SQL Server tables, you must configure the `dtxscript` file, which is located in the `SG-Tools` directory.

Modify the script's "Necessary SQL Server additions" section as follows:

- The `SERVERNAME` variable must be uncommented (remove the # character). Add the name of the machine on which the Microsoft SQL Server database resides to the right of the = sign.
- The `export SERVERNAME` command must be uncommented.
- The `SQLSERVER` variable must be uncommented. Add the name of the server to the right of the = sign.
- The `export SQLSERVER` command must be uncommented.
- If you want Models exports to display more than the first 32 characters of model names, you must change the value of the `SDE_OUTPUT_MODEL_LEN` variable. For Microsoft SQL Server, you can specify display of up to 255 characters.

When this script executes, the Microsoft SQL Server environment variables are exported.

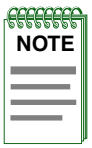
Appendix A

Data Structure of ASCII Files

Describes ASCII file format specifications for SPECTRUM data types using sample data.

The ASCII export option lets you export SPECTRUM data to ASCII delimited files. These files are created in the directory specified in the **Output Directory** field in the SPECTRUM Data Export main window and are formatted according to the options specified in the ASCII Format Options dialog box. The tables in this appendix contain the ASCII file format structure and sample data for the following exported data types:

- Associations
- Attributes
- Events
- Extended Attributes
- Model Type Hierarchy
- Model Types
- Models
- Relations
- Rules
- Statistics



In ASCII files, fields and records are separated by the field and record separators specified in the ASCII Format Options dialog box (see *Setting ASCII Format Options* on Page 3-7). Handles and Attribute IDs will be stored in the ASCII files in decimal or hexadecimal based on the Handle Format also specified in the ASCII Format Options dialog box. Hex values will be quoted if the quoted string option is specified in the ASCII Format Options dialog box as well.

SPECTRUM Data Types

Associations

Table A-1. ASCII File Format for Associations

Landscape Handle	Relation Handle	Left Model Handle	Right Model Handle
400000	10010	400000	40000f
400000	10010	400000	400010
400000	10010	400000	400012
handle	handle	handle	handle

Attributes

Table A-2. ASCII File Format for Attributes

Landscape Handle	Attribute ID	Attribute Name	Attribute Type	Group ID	Flags*
400000	10000	Modeltype_Name	17	0	800a
400000	10001	Modeltype_Handle	12	0	000a
400000	111f1	Version_Number	17	0	4002
handle	value	character field	numeric	numeric	hex flag

*Flag values are listed as follows:

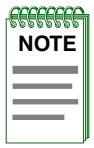
0x0001 = EXTERNAL
0x0002 = READABLE
0x0004 = WRITABLE
0x0008 = SHARED
0x0010 = LIST
0x0020 = GUARANTEED
0x0100 = RESERVED
0x0080 = GLOBAL
0x2000 = PRESERVE_LEGACY_VALUE

Events

Table A-3. ASCII File Format for Events

Date	Time	Landscape Handle	Model Handle	Event Type	Event Sev-erity	Alarm Num-ber*	Alarm Con-dition*	Event Message
04/15/ 1998	09:13:33	400000	400076	10701	020	290	3	Wed 15 Apr, 1998 - 9:13:33 - Alarm number 290 generated for device IPA.DDR.ES.SS of type Hub_CSI_IRM2. Current condition is RED. (event[00010701])
04/15/ 1998	09:15:04	400000	400076	10702	020	290	3	Wed 15 Apr, 1998 - 9:15:043 - Alarm number 290 cleared for device IPA.DDR.ES.SS of type Hub_CSI_IRM2. (event[00010701])
…	…	…	…	…	…	…	…	…

character field	character field	handle	handle	value	num.	dec. num.	dec. num.	character field



For event exports involving multiple landscapes, the data is sorted by landscape, by model type, and by model. For example, data for Landscape1 occurs first by order of model type, and by order of model within each model type (for example, ModelType1, Model1, Model2, ModelType2, Model1, Model2, etc.). Data for Landscape2 occurs next in the same manner, and so on for all additional landscapes.

Extended Attributes

Table A-4. ASCII File Format for Extended Attributes

Landscape Handle	Model Type Handle	Attribute ID	Extended Flags*	OID Prefix	Polling Group
400000	290000	11048	0000	1.3.6.1.2.1.8.6.0	0
400000	290000	10c48	0030		0
400000	290000	d01d1	0000	1.3.6.1.4.1.52.1.6.1.2.2.1.1.1	0
400000	290000	100d1	0000	1.3.6.1.4.52.1.6.2.2.4.0	0
handle	handle	hex value	hex flag	character field	numeric field

*Values for the extended attribute flags are as follows:
0x0001 = POLLED 0x0002 = LOGGED
0x0004 = INIT_AUTO 0x0008 = INIT_MANUAL
0x0010 = MEMORY 0x0020 = DATABASE
0x0100 = LOADED 0x0200 = READ_CALC
0x0400 = WRITE_CALC

Model Type Hierarchy

Table A-5. ASCII File Format for Model Type Hierarchy

Landscape Handle	Parent MTH	Child MTH	Depth First Order
400000	10317	10259	5
400000	10259	10059	3
400000	10259	10058	2
400000	10259	10287	1
400000	10254	10259	3
…	…	…	…
handle	handle	handle	numeric field

Model Types

Table A-6. ASCII File Format for Model Types

Landscape Handle	Model Type Handle	Model Type Name
400000	10000	Root
400000	10080	Gen_Rptr_Prt
400000	10300	CmipPif
400000	10380	PC_CSI_TRDNI
…	…	…
handle	handle	character field

Models

Table A-7. ASCII File Format for Models

Landscape Handle	Model Handle	Model Type Handle	Model Name	MAC Address	IP Address
400000	40025f	290000	my_mod	0.0.12.3.45.67	
400000	400325	370000	my&test		
400000	4194310	370000	goalie	0.1.23.4.56.78	123.211.211.000
400000	400328	4a0000	Gen Bridge Appd	1.2.34.5.67.89	
…	…	…	…	…	…
handle	handle	handle	character field	character field	character field

Relations

Table A-8. ASCII File Format for Relations

Landscape Handle	Relation Handle	Relation Name
400000	10008	Passes_Through
400000	10010	Lost_and_Found
400000	10018	Owns
400000	10020	Provides
…	…	…
handle	handle	character field

Rules

Table A-9. ASCII File Format for Rules

Landscape Handle	Relation Handle	Left Model Type Handle	Right Model Type Handle
400000	10018	102da	1004a
400000	10018	102da	10043
400000	10020	d0007	4a0007
400000	10020	d0007	d001e
400000	10020	210013	22001a
…	…	…	…
handle	handle	handle	handle

Statistics

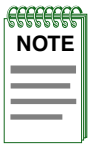
Table A-10. ASCII File Format for Statistics (Standard Format)

Date	Time	Landscape Handle	Model Handle	Attribute Values 1 through n*
04/15/1998	08:59:04	400000	400076	17451 7373
04/15/1998	09:09:03	400000	400076	17610 7518
04/15/1998	09:19:04	400000	400076	17714 7664
character field	character field	handle	handle	one attribute value per field

*The number of attributes depends on the number selected in the Statistics Filter dialog box when the export definition file was created.

Table A-11. ASCII File Format for Statistics (List Attribute Format)

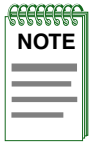
Date	Time	Landscape Handle	Model Handle	Attribute ID	Instance ID	Attribute Value
04/15/1998	08:59:04	400000	400076	11048	01	17451 7373
04/15/1998	09:09:03	400000	400076	10c48	02	17610 7518
04/15/1998	09:19:04	400000	400076	d01d1	03	17714 7664
04/15/1998	09:29:04	400000	400076	100d1	04	17864 7814
character field	character field	handle	handle	hex value	varying length character field (1024 character maximum)	varying length character field (1024 character maximum)



For statistical exports involving multiple landscapes, the data is sorted by landscape, by model type, and by model. For example, data for Landscape1 occurs first by order of model type, and by order of model within each model type (for example, ModelType1, Model1, Model2, ModelType2, Model1, Model2, etc.). Data for Landscape2 occurs next in the same manner, and so on for all additional landscapes.

Table A-12. Attribute Types

Attribute Type	Field Type
1	Boolean (0=FALSE)
2	Short (obsolete)
3	Integer (signed and unsigned)
4	Integer
5	Real
6	Date/Time (# of Secs since 00:00:00 1/1/70 GMT)
7	Not used
8	Integer (# of machine clock ticks)
9	Counter (Integer)
10	Gauge (Integer)
11	Model Handle
12	Model Type Handle
13	Relation Handle
14	Landscape Handle
15	Attribute ID
16	Octet String
17	Text String
18	Object ID String
19	IP Address
20	Agent ID (IP Address)
21	Not Used
22	Group ID (Integer)
23	Tagged Octet (Tag indicates how to interpret the contents)
24	Unsigned 64-bit long (for large number storage)



A missing value indicates that the attribute's value was not logged for that logging instance. A logging instance is the collection of log records logged by a model. For more information about attribute logging and polling groups, refer to the ***SPECTRUM Model Type Editor Guide***.

Schema Format

The schema may be in a separate file (separate) or in the same file (combined) as the data depending on the ASCII format option you selected. Data Export creates a schema file with the following format (fields are variable length except where indicated):

Byte Number	Field Description
0	Field Separator value
1	Record Separator value
2	Quoted String Option value Y/N
3	Field Separator
4	Hex/Decimal Numeric Option value H/D
5	Field Separator
6	Time Format Option value[1]
7	Field Separator
8-17	# of Records in corresponding data (decimal)
18	Field Separator
19	Date and Time created/updated[2]
	Field Separator
	Version of Data Export
	Record Separator
	# of Landscapes to export data from
	Record Separator
	VNM Name, Landscape Handle pairs (based on number of landscapes)[6]
	Record Separator
	Exported Data Type
	Record Separator
	# of Models selected [3]
	Record Separator
	Model Handle, Name pairs (based on number of models)[4]
	Record Separator
	# of Attributes or Conditions selected [3]
	Record Separator
	Attibute ID, Name, Type or Alarm Condition, Name (based on number of attributes/conditions)[5]
	Record Separator
	# of Event Code Filters chosen[7]
	Record Separator
	Event Code filename from CsEvFormat directory (based on number of filters)
	Record Separator

The following are repeated for each field in the corresponding ASCII output file:

Field Name
Field Separator
Field Type (Refer to Table A-12 for a description of Field Types.)
Record Separator

---

1. Time Format
   0 = Time Ticks (seconds since 1/1/70)
   1 = One Field (MM/DD/YY HH:MM:SS)
   2 = Two Fields (MM/DD/YY Field Separator HH:MM:SS)
2. Format depends on Time Format
3. Applies to Events and Statistics only, 0 for all other Data Types.
4. Model Handle, Field Separator, Model Name, Record Separator
5. Attribute ID, Field Separator, Attribute Name, Field Separator, Attribute Type, Record Separator *or*
   Event Condition, Field Separator, Event Condition Text, Record Separator
6. VNM Name, Field Separator, Landscape Handle (hex), Record Separator
7. This only applies for events. If specific event codes are not chosen, this value is 0.

Appendix B

Data Structure of SAS Data Sets

Describes SAS format specifications for SPECTRUM data types using sample data.

The SAS export option lets you export SPECTRUM data to SAS data sets. These SAS data sets are created in the directory specified in the **Output Directory** field in the SPECTRUM Data Export main window. The tables in this appendix contain the SAS format structure and sample data for the following exported data types:

- Associations
- Attributes
- Events
- Extended Attributes
- Model Type Hierarchy
- Model Types
- Models
- Relations
- Rules
- Statistics

SPECTRUM Data Types

Associations

Description: List of all associations

Variables:

lh	The landscape handle, a 6-byte SAS numeric
rh	The relation handle, a 6-byte SAS numeric
lmh	The left model handle, a 6-byte SAS numeric
rmh	The right model handle, a 6-byte SAS numeric

Indexed by: lh + rh + lmh + rmh

Compressed: No

Table B-1. SAS Format for Associations

Landscape Handle (lh)	Relation Handle (rh)	Left Model Handle (lmh)	Right Model Handle (rmh)
4194304	65552	4194304	4194311
4194304	65552	4194304	4194309
4194304	65552	4194304	4194308
4194304	65552	4194304	4194305
4194304	65552	4194304	4194306
…	…	…	…
6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)

INDEX

Attributes

Description: List of attribute descriptions for all attributes

Variables:

lh	The landscape handle, a 6-byte SAS numeric
attrid	The attribute ID, a 6-byte SAS numeric
attrname	The attribute name, a 32-byte string
attrtype	The attribute type, a 6-byte SAS numeric
groupid	The group ID, a 6-byte SAS numeric
flags	The flags describing the attribute, a 6-byte SAS numeric. The bit flags have the following values: 01 = EXTERNAL 02 = READABLE 04 =WRITABLE 08 = SHARED 16 = LIST 32 = GUARANTEED 256 = RESERVED 128 = GLOBAL 8192 = PRESERVE_LEGACY_VALUE

Indexed by: lh + attrid

Compressed: No

Table B-2. SAS Format for Attributes

Landscape Handle (lh)	Attribute ID (attrid)	Attribute Name (attrname)	Attribute Type (attrtype)	Group ID (groupid)	Flags (flags)
4194304	65562	Packet_Rate	3	0	70
4194304	65563	Soft_Error_Rate	3	0	70
4194304	65564	Hard_Error_Count	3	0	70
…	…	…	…	…	…
6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)	32-byte string	6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)

———- INDEX ———

Events

Description: Event data collected during the specified period

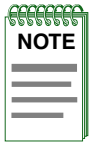
Variables:
ts The time stamp, a 6-byte SAS numeric
lh The landscape handle, a 6-byte SAS numeric
mh The model handle, a 6-byte SAS numeric
eventtypeThe event type, a 6-byte SAS numeric
severityThe event severity, a 6-byte SAS numeric
alarmThe alarm number, a 6-byte SAS numeric
condThe event condition code, a 6-byte SAS numeric
eventmsgThe event message, a 200-byte string

Indexed by: type + lh + dsname
Compressed: Yes

Table B-3. SAS Format for Events

Time Stamp (ts)	Landscape Handle (lh)	Model Handle (mh)	Event Type (eventtype)	Severity (severity)	Alarm Number (alarm)	Condition (cond)	Event Message (eventmsg)
1061219685	4194304	4194310	67330	20	41	6	Wed 15 April, 1998 - 10:07:03 - Alarm number 41 cleared for device Demo CNB-25 of type Bdg_CSI_CNB25. (event 00010702)
1061387265	4194304	4194310	67305	20	.	6	Wed 15 April, 1998 - 10:07:03 - Device Demo CNB-25 of type Bdg_ CSI_CNB25 has been contacted. (event 00010301)
6-byte SAS numeric (decimal)	6-byte SAS num. (dec.)	6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)	6-byte SAS num. (dec.)	6-byte SAS num. (dec.)	200-byte string

———INDEX———



For event exports involving multiple landscapes, the data is sorted by landscape, by model type, and by model. For example, data for Landscape1 occurs first by order of model type, and by order of model within each model type (for example, ModelType1, Model1, Model2, ModelType2, Model1, Model2, etc.). Data for Landscape2 occurs next in the same manner, and so on for all additional landscapes.

Extended Attributes

Description: List of extension flags and object identifiers for all attributes

Variables:

- lh — The landscape handle, a 6-byte SAS numeric
- mth — The model type handle, a 6-byte SAS numeric
- attrid — The attribute ID, a 6-byte SAS numeric
- xflags — The attribute's extension flags, a 6-byte SAS numeric. The bitflags have the following values:
  01 = POLLED 02 = LOGGED
  04 = INIT_AUTO 08 = INIT_MANUAL
  16 = MEMORY 32 = DATABASE
  256 = LOADED 512 = READ_CALC
  1024 = WRITE_CALC
- oid — The OID prefix for the attribute, a 130-byte string. Refers to the "fixed" part of a MIB variable's OID, not the instance id.
- pollgrp — The polling group id, a 4-byte SAS numeric

Indexed by: lh + mth + attrid

Compressed: No

Table B-4. SAS Format for Extended Attributes

Landscape Handle (lh)	Model Type Handle (mth)	Attribute ID (attrid)	Extension Flags (xflags)	OID Prefix (oid)	Polling Group (pollgrp)
4194304	851968	852498	0	1.3.6.1.4.1.52.4.1.1.2.7.0	0
4194304	851968	852107	0	1.3.6.1.4.1.52.4.1.1.2.3.0	0
4194304	851968	852134	0	1.3.6.1.4.1.52.4.1.1.2.6.1.1	0
4194304	851968	852102	0	1.3.6.1.4.1.52.4.1.1.2.1.0	0
6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)	130-byte string	4-byte SAS numeric (decimal)
INDEX					

Model Type Hierarchy

Description: The model type hierarchy

Variables:

lh	The landscape handle, a 6-byte SAS numeric
pmth	The parent model type handle, a 6-byte SAS numeric
cmth	The child model type handle, a 6-byte SAS numeric
dforder	The depth first order, a 4-byte SAS numeric

Indexed by: lh + pmth + cmth + dforder

Compressed: No

Table B-5. SAS Format for Model Type Hierarchy

Landscape Handle (lh)	Parent Model Type Handle (pmth)	Child Model Type Handle (cmth)	Depth First Order (dforder)
4194304	65536	66269	00000001
4194304	66269	65538	00000001
4194304	65538	65539	00000001
4194304	65559	66248	00000001
4194304	65559	65539	00000002
…	…	…	…
6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)	4-byte SAS numeric (decimal)

INDEX

Model Types

Description: List of all model types

Variables:

lh	The landscape handle, a 6-byte SAS numeric
mth	The model type handle, a 6-byte SAS numeric
mtname	The model type name, a 32-byte string

Indexed by: lh + mth

Compressed: No

Table B-6. SAS Format for Model Types

Landscape Handle (lh)	Model Type Handle (mth)	Model Type Name (mtname)
4194304	65536	Root
4194304	65664	Gen_Rptr_Prt
4194304	66304	CmipPif
4194304	66432	PC_CSI_TRDNI
4194304	66441	SipMib
...	...	...

6-byte SAS numeric (decimal) — 6-byte SAS numeric (decimal) — 32-byte string

INDEX

Models

Description:	List of all models	
Variables:	lh	The landscape handle, a 6-byte SAS numeric
	mh	The model handle, a 6-byte SAS numeric
	mth	The model type handle, a 6-byte SAS numeric
	mname	The model name, by default a 32-byte string (can be user-defined up to 200 characters)
	macaddr	The MAC address of the model, a 17-byte string
	ipaddr	The IP address of the model, a 15-byte string
Indexed by:	lh + mh mth	
Compressed:	No	

Table B-7. SAS Format for Models

Landscape Handle (lh)	Model Handle (mh)	Model Type Handle (mth)	Model Name (mname)	MAC Address (macaddr)	IP Address (ipaddr)
4194304	4194308	65600	World		
4194304	4194590	65608	Demo Room		
4194304	4194309	65681	Universe		
4194304	4194304	66238	LostFound		
4194304	4194310	65539	goalie	0.1.23.4.56.78	123.456.789.000
…	…	…	…	…	…
6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)	32-byte string (up to 200 characters)	17-byte string	15-byte string
——— INDEX1 ———		INDEX2			

Relations

Description: List of all relations

Variables:
- lh — The landscape handle, a 6-byte SAS numeric
- rh — The relation handle, a 6-byte SAS numeric
- relname — The ASCII name of the relation, a 32-byte string

Indexed by: lh + rh

Compressed: No

Table B-8. SAS Format for Relations

Landscape Handle (lh)	Relation Handle (rh)	Relation Name (relname)
4194304	65544	Passes_Through
4194304	65546	Lost_and_Found
4194304	65560	Owns
4194304	65553	Contains
4194304	65537	File_Server
…	…	…

6-byte SAS numeric (decimal) **6-byte SAS numeric (decimal)** **32-byte string**

——————— INDEX ———————

Rules

Description: List of all rules

Variables:

lh	The landscape handle, a 6-byte SAS numeric
rh	The relation handle, a 6-byte SAS numeric
lmth	The left model type handle, a 6-byte SAS numeric
rmth	The right model type handle, a 6-byte SAS numeric

Indexed by: lh + rh + lmth + rmth

Compressed: No

Table B-9. SAS Format for Rules

Landscape Handle (lh)	Relation Handle (rh)	Left Model Type Handle (lmth)	Right Model Type Handle (rmth)
4194304	65538	65596	65624
4194304	65538	65596	65625
4194304	65538	65596	65750
4194304	65538	65596	66262
4194304	65538	65596	66466
…	…	…	…
6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)
INDEX			

Statistics

Description: Statistical data collected during the specified time period

Standard Format

Variables:

ts	Time stamp, a 6-byte SAS numeric
lh	The landscape handle, a 6-byte SAS numeric
mh	The model handle, a 6-byte SAS numeric
at#1	Value of attribute #1 for the time and model
at#2	Value of attribute #2 for the time and model
at#n	Value of attribute #n for the time and model

Where: The actual names of variables *at#1* through *at#n* are derived from the attribute IDs of the selected logged attributes. First the attribute ID is converted to hexadecimal, then its first digit is changed to a non-numeric character, following this scheme:

0 → _4 → d8 → hc → l
1 → a5 → e9 → id → m
2 → b6 → fa → je → n
3 → c7 → gb → kf → o

The number of attributes (at#_) depends on the number selected in the Statistics Filter dialog box when the export definition file was created.

Indexed by: lh + ts + mh

Compressed: Yes

Table B-10. SAS Format for Statistics (Standard Format)

Time Stamp (ts)	Landscape Handle (lh)	Model Handle (mh)	Value of Attribute #1 (at#1)	Value of Attribute #2 (at#2)	...	Value of Attribute #n (at#n)
1065699650	4194304	4194457	.	1	...	.
1065699608	4194304	4194490	.	1	...	.
1065699080	4194304	4194310	.	.	...	.
1065699075	4194304	4194455	.	1	...	.
6-byte SAS numeric (decimal)	**6-byte SAS numeric (decimal)**	**6-byte SAS numeric (decimal)**	**Format dependent upon the attribute type (See Table B-12)**			

INDEX

List Attribute Format

Variables:	ts	Time stamp, a 6-byte SAS numeric
	lh	The landscape handle, a 6-byte SAS numeric
	mh	The model handle, a 6-byte SAS numeric
	aid	Attribute ID, a hex value
	oid	Instance ID, a $varying200 field
	value	Attribute value, a $varying200 field
Indexed by:	lh + ts + mh	
Compressed:	Yes	

Table B-11. SAS Format for Statistics (List Attribute Format)

Time Stamp (ts)	Landscape Handle (lh)	Model Handle (mh)	Attribute ID (aid)	Instance ID (oid)	Attribute Value (value)
1065699650	4194304	4194457	852498	01	17451 7373
1065699608	4194304	4194490	852107	02	17610 7518
1065699080	4194304	4194310	852134	03	17714 7664
1065699075	4194304	4194455	852102	04	17864 7814
6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)	6-byte SAS numeric (decimal)	hex value	$varying200 field	$varying200 field

——————— INDEX ———————

Table B-12. Attribute Types

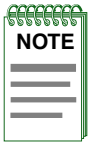
Attribute Type	Input Size in Bytes	SAS Storage Size*	Field Type/Comments
1	1	6	Boolean (0 = False)
2	5	6	Short (obsolete)
3	10	6	Integer (signed and unsigned)
4	10	6	Integer (enum)
5	16	8	Real
6	10	6	Date
7			Not Used

Table B-12. Attribute Types (Continued)

Attribute Type	Input Size in Bytes	SAS Storage Size*	Field Type/Comments
8	10	6	Time Ticks
9	10	6	Counter
10	10	6	Gauge
11	8	6	Model Handle
12	8	6	Model Type Handle
13	8	6	Relation Handle
14	8	6	Landscape Handle
15	8	6	Attribute ID
16	130	130	Octet String
17	130	130	Text String
18	130	130	Object ID String
19	15	15	IP Address
20	15	15	Agent ID (IP Address)
21			Not Used
22	8	6	Group ID
23	130	130	Tagged Octet
24	20	6**	Unsigned 64 bit long (for large number storage)

*Default length for numeric variables is 6. This is the amount of storage space SAS allocates internally to store the attribute values. Numeric values are stored in floating point format.

**With very large numbers, there will be some lack of precision (i.e., the numerals to the right will be '0' rather than the actual number). For example, the number 18,446,744,556,876,789 might be 18,446,744,556,800,000.



For statistical exports involving multiple landscapes, the data is sorted by landscape, by model type, and by model. For example, data for Landscape1 occurs first by order of model type, and by order of model within each model type (for example, ModelType1, Model1, Model2, ModelType2, Model1, Model2, etc.). Data for Landscape2 occurs next in the same manner, and so on for all additional landscapes.

Imported Data Information

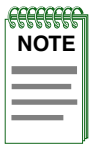
Description: List of the time stamps and ranges for the imported data sets

Variables:

type	The type of data (Rules, Models, etc.), 16-byte text, INDEX1
ts	The time stamp (the time of the export), a 6-byte SAS numeric
dsname	The data set name, 8-byte text, INDEX3
dsdir	The data set directory, 64-byte text
lh	The landscape handle, a 6-byte SAS numeric, INDEX2
ssname	The SpectroSERVER name, 32-byte text
rs	The range start timestamp (for Events and Statistics only), a 6-byte SAS numeric
re	The range end timestamp (for Events and Statistics only), a 6-byte SAS numeric

Indexed by: type + lh + dsname

Compressed: No



When an export is executed exporting data from multiple landscapes, a separate Impoinfo record will be written for each landscape.

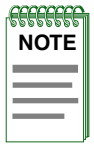
Appendix C

Data Structure of SQL Tables

Provides SQL (Ingres, Sybase, Oracle, and Microsoft SQL Server) format specifications for SPECTRUM data types using sample data.

The various SQL export options let you export SPECTRUM data to SQL tables. These tables are created in the database you specify in the **Database Name** field in the SPECTRUM Data Export main window. The tables in this appendix contain the SQL format structure and sample data for the following exported data types:

- Associations
- Attributes
- Events
- Extended Attributes
- Model Type Hierarchy
- Model Types
- Models
- Relations
- Rules
- Statistics



The columns described in this appendix do not have default values. Unless otherwise noted, these columns do not allow nulls.

SPECTRUM Data Types

Associations

Description: List of all associations

Columns:

lh	The landscape handle, a 4-byte integer
rh	The relation handle, a 4-byte integer
lmh	The left model handle, a 4-byte integer
rmh	The right model handle, a 4-byte integer

Indexed by: lh + rh + lmh + rmh

Table C-1. Format for Associations

Landscape Handle (lh)	Relation Handle (rh)	Left Model Handle (lmh)	Right Model Handle (rmh)
4194304	65538	262149	262150
4194304	65538	262149	262159
4194304	65538	262159	262160
4194304	65538	262159	262161
4194304	65538	262159	262162
…	…	…	…

Attributes

Description: List of attribute descriptions for all attributes

Columns:

lh	The landscape handle, a 4-byte integer
attrid	The attribute ID, a 4-byte integer
attrname	The attribute name, a 31-byte string
attrtype	The attribute type, a 2-byte integer
groupid	The group ID, a 4-byte integer
flags	The flags describing the attribute, a 4-byte integer. The bit flags have the following values: 01 = EXTERNAL 02 = READABLE 04 = WRITABLE 08 = SHARED 16 = LIST 32 = GUARANTEED 256 = RESERVED 128 = GLOBAL 8192 = PRESERVE_LEGACY_VALUE

Indexed by: lh + attrid+ attrname

Table C-2. Format for Attributes

Landscape Handle (lh)	Attribute ID (attrid)	Attribute Name (attrname)	Attribute Type (attrtype)	Group ID (groupid)	Flags (flags)
4194304	65562	Packet_Rate	3	0	70
4194304	65563	Soft_Error_Rate	3	0	70
4194304	65564	Hard_Error_Count	3	0	70
…	…	…	…	…	…
4-byte integer	4-byte integer	31-byte string	2-byte Integer	4-byte integer	4-byte integer

INDEX

Events

Description: Event data collected during the specified time period

Columns:

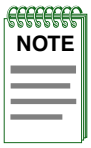
ts	The time stamp, a date field
lh	The landscape handle, a 4-byte integer
mh	The model handle, a 4-byte integer
eventype	The event type, a 4-byte integer
severity	The event severity, a 4-byte integer
alarm _num	The alarm number, a 4-byte integer, nulls allowed
condition	The event condition code, a 2 byte integer, nulls allowed
eventmsg	The event message, a database-dependent varying character string, as follows: Oracle = 512 characters; Ingres = 256 characters Microsoft SQL Server = 255 characters Sybase = 255 characters

Indexed by: ts + lh + mh

Table C-3. Format for Events

Time Stamp (ts)	Landscape Handle (lh)	Model Handle (mh)	Event Type (eventype)	Severity (sever-ity)	Alarm# (alarm_num)	Condition (condition)	Event Message (eventmsg)
04/15/ 1998 10:07:03	4194304	10485760	67330	0	2	6	Wed 15 April 1998 - 10:07:03 - Alarm number 41 cleared for device Demo CNB-25 of type Bdg_CSI_ CNB25. (event 00010702)
04/15/ 1998 10:07:03	4194304	10485760	66305	0	0		Wed 15 April 1998 - 10:07:03 - Device Demo CNB-25 of type Bdg_CSI_CNB25 has been contacted. (event 00010301)
date	4-byte int.	4-byte int.	4-byte int.	4-byte int.	4-byte int.	2-byte int.	database-dependent varchar

INDEX



For event exports involving multiple landscapes, the data is sorted by landscape, by model type, and by model. For example, data for Landscape1 occurs first by order of model type, and by order of model within each model type (for example, ModelType1, Model1, Model2, ModelType2, Model1, Model2, etc.). Data for Landscape2 occurs next in the same manner, and so on for all additional landscapes.

Extended Attributes

Description: List of extension flags and object identifiers for all attributes

Columns:

lh	The landscape handle, a 4-byte integer
mth	The model type handle, a 4-byte integer
attrid	The attribute ID, a 4-byte integer
xflags	The attribute's extension flags, a 2-byte integer. The bit flags have the following values: 01 = POLLED 02 = LOGGED 04 = INIT_AUTO 08 = INIT_MANUAL 16 = MEMORY 32 = DATABASE 256 = LOADED 512 = READ_CALC 1024 = WRITE_CALC
oidstr	The object identifier for the attribute, a 130-byte varying character string, nulls allowed
pollgroup	The attribute's polling group id, a 2-byte integer

Indexed by: lh + mth + attrid

Table C-4. Format for Extended Attributes

Landscape Handle (lh)	Model Type Handle (mth)	Attribute ID (attrid)	Extension Flags (xflags)	Object Identifier for Attribute (oidstr)	Log Group (pollgroup)
4194304	65751	71644	0	1.3.6.1.4.1.52.3.158.0.98 .3.1.0.0	0
4194304	65751	69817	0	1.3.6.1.4.1.52.3.130.0.13 0.1.2.0	0
4194304	65751	70347	0	1.3.6.1.4.1.52.3.148.0.10 2.1.2.1	0
4194304	65751	70350	0	1.3.6.1.4.1.52.3.148.0.10 4.1.2.0	0
4-byte integer	4-byte integer	4-byte integer	2-byte integer	130-byte varchar	2-byte integer

——————— INDEX ———————

Model Type Hierarchy

Description: The model type hierarchy

Columns:

lh	The landscape handle, a 4-byte integer
pmth	The parent model type handle, a 4-byte integer
cmth	The child model type handle, a 4-byte integer
dforder	The depth first order, a 2-byte integer

Indexed by: lh + pmth + cmth + dforder

Table C-5. Format for Model Type Hierarchy

Landscape Handle (lh)	Parent Model Type Handle (pmth)	Child Model Type Handle (cmth)	Depth First Order (dforder)
4194304	65677	66570	9
4194304	65677	65560	8
4194304	65677	66521	7
4194304	65677	65611	6
4194304	65676	65540	4
…	…	…	…
4-byte integer	4-byte integer	4-byte integer	2-byte integer

INDEX

Model Types

Description: List of all model types

Columns:

lh	The landscape handle, a 4-byte integer
mth	The model type handle, a 4-byte integer
mtname	The model type name, a 14-byte string

Indexed by: lh + mth

Table C-6. Format for Model Types

Landscape Handle (lh)	Model Type Handle (mth)	Model Type Name (mtname)
4194304	65536	Root
4194304	65664	Gen_Rptr_Prt
4194304	66304	CmipPif
4194304	66432	PC_CSI_TRDNI
4194304	66441	SipMib
...	...	...

Models

Description:	List of all models	
Columns:	lh	The landscape handle, a 4-byte integer
	mh	The model handle, a 4-byte integer
	mth	The model type handle, a 4-byte integer
	mname	The model name, a user-defined varying character string, defaults to 31 bytes, nulls allowed
	macadr	The MAC address of the model, a 17-byte string, nulls allowed
	ipadr	The IP address of the model, a 15-byte string, nulls allowed
Indexed by:	lh + mh	
	mth	

Table C-7. Format for Models

Landscape Handle (lh)	Model Handle (mh)	Model Type Handle (mth)	Model Name (mname)	MAC address (macadr)	IP Address (ipadr)
4194304	10485762	65600	World		
4194304	10496744	65608	Demo Room		
4194304	104885763	65681	Universe		
4194304	10488764	66238	LostFound		
4194304	00400001	66239	goalie	1.2.34.5.67.89	123.456.789.000
…	…	…	…	…	…
4-byte integer	4-byte integer	4-byte integer	user-defined var char	17-byte string	15-byte string
——— INDEX1———		INDEX2			

Relations

Description: List of all relations

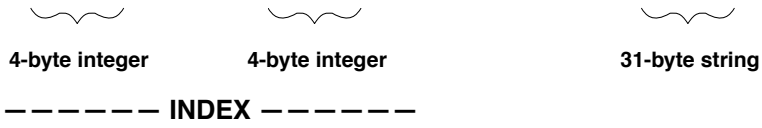
Columns:

lh	The landscape handle, a 4-byte integer
rh	The relation handle, a 4-byte integer
relname	The relation name, a 31-byte string

Indexed by: lh + rh

Table C-8. Format for Relations

Landscape Handle (lh)	Relation Handle (rh)	Relation Name (relname)
4194304	65544	Passes_Through
4194304	65552	Lost_and_Found
4194304	65560	Owns
4194304	65537	Contains
4194304	65553	File_Server
...	...	...



Rules

Description: List of all rules

Columns:

lh	The landscape handle, a 4-byte integer
rh	The relation handle, a 4-byte integer
lmth	The left model type handle, a 4-byte integer
rmth	The right model type handle, 4-byte integer

Indexed by: lh + rh + lmth + rmth

Table C-9. Format for Rules

Landscape Handle (lh)	Relation Handle (rh)	Left Model Type Handle (lmth)	Right Model Type Handle (rmth)
4194304	65560	66266	65610
4194304	65560	66266	65603
4194304	65560	66266	2162733
4194304	65560	66266	66275
4194304	65560	66266	65608
…	…	…	…
4-byte integer	4-byte integer	4-byte integer	4-byte integer

INDEX

Statistics

Description: Statistical data collected during the specified time period

Standard Format

Columns:

ts	The time stamp, a date field
lh	The landscape handle, a 4-byte integer
mh	The model handle, a 4-byte integer
at#1	Value of attribute #1 for the time and model handle*
at#2	Value of attribute #2 for the time and model handle*
at#n	Value of attribute #n for the time and model handle*
*	Where the actual names of columns at#1 through at#n are derived from the first 24 characters of the selected logged attributes.

Indexed by: ts + lh + mh

Table C-10. Format for Statistics (Standard Format)

Time Stamp (ts)	Landscape Handle (lh)	Model Handle (mh)	Value of Attribute # (at#1 through at#n)**
15-April-1998 15:10:12	4194304	10485760	4235
15-April-1998 15:10:12	4194304	10485761	6831
15-April-1998 15:10:12	4194304	10485760	2874
15-April-1998 15:10:12	4194304	10485762	372
date	**4-byte integer**	**4-byte integer**	**Format dependent on attribute type (see Table C-12)**

——————INDEX——————

* The size depends on the attribute type shown in Table C-12.
**The number of attributes (at#n) depends on the number selected in the Statistics Filter dialog box when the export definition file was created.

List Attribute Format

Columns:	ts	The time stamp, a date field
	lh	The landscape handle, a 4-byte integer
	mh	The model handle, a 4-byte integer
	attrid	Attribute ID, a hex value
	inst	Instance ID, a varying length character field
	attrval	Attribute value, a varying length character field*

Indexed by: ts + lh + mh

Table C-11. Format for Statistics (List Attribute Format)

Time Stamp (ts)	Landscape Handle (lh)	Model Handle (mh)	Attribute ID (attrid)	Instance ID (inst)	Attribute Value (attrval)
15-April-1998 15:10:12	4194304	10485760	852498	01	17451 7373
15-April-1998 15:10:12	4194304	10485761	852107	02	17610 7518
15-April-1998 15:10:12	4194304	10485760	852134	03	17714 7664
15-April-1998 15:10:12	4194304	10485762	852102	04	17864 7814
date	4-byte integer	4-byte integer	hex value	varying length character field*	varying length character field*

——————INDEX——————

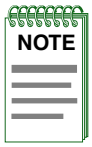
* Maximum possible length is 1024 for Oracle, 255 for Sybase and Microsoft SQL Server, and 512 for Ingres.

Table C-12. Attribute Types

Attribute Type	Field Type
1	Integer Boolean (0=FALSE)
2	Short
3	Integer (signed and unsigned)
4	Integer

Table C-12. Attribute Types (Continued)

5	Float8
6	Date/Time (# of seconds since 00:00:00 1/1/70 GMT)
7	Not used
8	Integer (# of machine clock ticks)
9	Integer Counter
10	Integer Gauge
11	Integer Model Handle
12	Integer Model Type Handle
13	Integer Relation Handle
14	Integer Landscape Handle
15	Integer Attribute ID
16	varchar Octet string
17	varchar Text string
18	varchar Object ID String
19	varchar IP Address
20	varchar Agent ID (IP Address)
21	Not used
22	Integer Group ID
23	varchar Tagged Octet
24	Float8 Unsigned 64-bit long (for large number storage)



For statistical exports involving multiple landscapes, the data is sorted by landscape, by model type, and by model. For example, data for Landscape1 occurs first by order of model type, and by order of model within each model type (for example, ModelType1, Model1, Model2, ModelType2, Model1, Model2, etc.). Data for Landscape2 occurs next in the same manner, and so on for all additional landscapes.

Imported Data Information

Description: Table containing export criteria for tables in the database

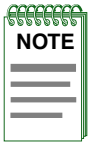
Variables:

vnm	The SpectroSERVER name, a 32-byte string
lh	The landscape handle, a 4-byte integer
table_name	The table name, an 18-byte string
export_type	The SPECTRUM data type, a 16-byte string
export_ts	The date field
range_start	The starting date (Statistics and Events only), a date field, nulls allowed
range_end	The end date (Statistics and Events only), a date field, nulls allowed

Table C-13. Format for Imported Data Information

SpectroSERVER (vnm)	Landscape Handle (lh)	Table Name (table_name)	Export Type (export _type)
my_vnm	4194304	stats	statistics
SPECTRUM	4456448	events_spectrum	events
32-byte string	4-byte integer	18-byte string	16-byte string

Export Date/Time (export_ts)	Export Range Start (range_start)	Export Range End (range_end)
15-April-1998 15:10:05	10-April-1998 00:00:00	14-April-1998 22:00:00
15-April-1998 15:10:05	10-April-1998 00:00:00	14-April-1998 22:00:00
date	date	date



When an export is executed exporting data from multiple landscapes, a separate Impoinfo entry will be written for each landscape.

Appendix D

Data Export Resource File

Describes the Data Export resource file and how to configure it before and after installing Data Export.

The Data Export resource file, SDE, consists of parameters that define the appearance and operational features of Data Export running in the X Window System environment. You can customize default settings to meet your particular requirements during installation (see *Configuring Default Resource File Parameters During Installation* on Page D-7) or after installation with a text editor (such as vi).

SPECTRUM writes SDE to the `.../Spectrum/app-defaults` directory at installation.

An example SDE file is listed as follows:

```
!  SPECTRUM Data Export default startup parameters
!
## The definition file directory goes with load and save as commands

!  Definition File default directory
*DefFileDefaultDir: /usr/data/Spectrum/5.0/export.output

## The export program goes with export now menu command
!  This is the command to invoke the dataexp task with Export Now command.
*DataExportProg: /usr/data/Spectrum/5.0/SG-Tools/dtxscript

!  Description is simply a user definable title for the export definition
!  file.
*Description: Export Definition Description

## Use the default landscape handle defined by Install
! PreferredLandscapes (a comma-separated list of landscape handles
! user is interested in working with) are the initial selection in the
! landscape selection dialog box.
*PreferredLandscapes: 0x11c0000

! AutoExpand determines whether to automatically expand the preferred
! landscapes for the user.  0 = autoexpand off, 1 = autoexpand on.
*AutoExpand: 1
```

```
! CaseSensitive determines the default sensitivity for searches and
! filters.
! 0 = case insensitive, 1 = case sensitive.
*CaseSensitive: 1

! SearchDefault determines the search/filter default.
! 0 = filter default, 1 = search default.
*SearchDefault: 1

! SearchHighlightColor is the color used to indicate whether search
! or filter is active.  Default 128 (yellow).
*SearchHighlightColor: 128

!  OutputDefaultDir takes on the following definitions:
!  ASCII = Default output directory for exported ASCII data files.
!  Ingres= Default output directory for temporary ASCII data files.
!  Sybase= Default output directory for temporary ASCII data files.
!  Oracle= Default output directory for temporary ASCII data files.
!  SqlServer= Default output directory for temporary ASCII data files.
!  SAS   = Default database directory.
*OutputDefaultDir: /usr/data/Spectrum/5.0/export.output

!  DBDefaultName is the default database name for database exports.
*DBDefaultName: spectrum

!  PostExportDefault is the default post export script.
*PostExportDefault:

!  OutputFormat take on the following values:
!  0 = ASCII, 1 = Ingres, 2 = SAS, 3 = Sybase, 4 = Oracle, 5 = SQL Server.
*OutputFormat: 0

!  This is the Events Default Text Value.
*EventsName: event

!  The EventsOutputMode indicates one of three file write modes:
!  0 = append, 1 = overwrite, 2 = date (append date extension to filename).
*EventsOutputMode: 1

!  The EventsFormatPath is the path to the files that allow event
!  formatting.
*EventsFormatPath: /usr/data/Spectrum/5.0/SG-Support/CsEvFormat

!  This is the Statistics Default Text Value.
*StatsName: stat

!  The StatsOutputMode indicates one of three file write modes:
!  0 = append, 1 = overwrite, 2 = date (append date extension to filename).
*StatsOutputMode: 1

! Events and Statistics ExportRange may take one of the following values:
! 0 = Custom, 1 = Day, 2 = Week, 3 = Month.
*ExportRange: 0

!  This is the Model Types Default Text Value.
*MdlTypesName: modtyp
!  This is the Associations Default Text Value.
*AssocName: assoc
```

```
!  This is the Model Type Hierarchy Default Text Value.
*MTHierarchyName: mthier

!  This is the Relations Default Text Value.
*RelationsName: relation

!  This is the Models Default Text Value.
*ModelName: model

!  This is the Rules Default Text Value.
*RulesName: rules

!  This is the Attributes Default Text Value.
*AttrsName: attr

!  This is the External Attributes Default Text Value.
*ExtAttrsName: extattr

!  This is the FieldSeparator as chosen from the ASCII Options menu.
!  The following choices may be made:
!  0 = space, 1 = tab, 2 = comma, 3 = semicolon, 4 = user defined,
!  5 = colon.
*AsciiFieldSeparator: 3

!  If user defined was selected above for AsciiFieldSeparator, then
!  AsciiUserDefinedFieldSepChar is a one-character entry that describes the
!  desired field separator character.
*AsciiUserDefinedFieldSepChar: %
!  This is the RecordSeparator as chosen from the ASCII Options menu.
!  The following choices may be made:
!  0 = CR, 1 = LF, 2 = CR/LF, 3 = tab, 4 = user defined.
*AsciiRecordSeparator: 2

!  If user defined was selected above for AsciiRecordSeparator, then
!  AsciiUserDefinedRecordSepChar is a one-character entry that describes
!  the desired record separator character.
*AsciiUserDefinedRecordSepChar: &

!  Schema for ASCII exports
!  takes one of two values: 0 = Combined, 1 = Separate.
*AsciiSchema: 1

!  FieldFormat for ASCII takes one of two values:
!  0 = quoted strings, 1 = non-quoted strings.
*AsciiFieldFormat: 1

!  DateTime Format for ASCII exports.
!  The following choices may be made:
!  0 = Separate (2 fields), 1 = Combined (1 field), 2 = Time Ticks.
*AsciiDateTimeFormat: 0

!  Handle Format for ASCII exports takes one of two values:
!  0 = Hexadecimal, 1 = Decimal.
*AsciiHandleFormat: 0

!  This is the FieldSeparator used for temporary Ingres export files.
!  The following choices may be made:
!  0 = space, 1 = tab, 2 = comma, 3 = semicolon, 4 = user defined,
!  5 = colon.
*IngresFieldSeparator: 1
```

```
!  If user defined was selected above for IngresFieldSeparator, then
!  IngresUserDefinedFieldSepChar is a one-character entry that describes
!  the desired field separator character.
*IngresUserDefinedFieldSepChar: %

!  This is the RecordSeparator used for temporary Ingres export files.
!  The following choices may be made:
!  0 = CR, 1 = LF, 2 = CR/LF, 3 = tab, 4 = user defined.
*IngresRecordSeparator: 2

!  If user defined was selected above for IngresRecordSeparator, then
!  IngresUserDefinedRecordSepChar is a one-character entry that
!  describes the desired record separator character.
*IngresUserDefinedRecordSepChar: &

!  DateTime Format used for temporary Ingres export files.
!  The following choices may be made:
!  1 = Combined (1 field), 2 = Time Ticks.
*IngresDateTimeFormat: 1

!  This is the FieldSeparator used for temporary Sybase export files.
!  The following choices may be made:
!  0 = space, 1 = tab, 2 = comma, 3 = semicolon, 4 = user defined,
!  5 = colon.
*SybaseFieldSeparator: 1

!  If user defined was selected above for SybaseFieldSeparator, then
!  SybaseUserDefinedFieldSepChar is a one-character entry that describes
!  the desired field separator character.
*SybaseUserDefinedFieldSepChar: %

!  This is the RecordSeparator used for temporary Sybase export files.
!  The following choices may be made:
!  0 = CR, 1 = LF, 2 = CR/LF, 3 = tab, 4 = user defined.
*SybaseRecordSeparator: 2

!  If user defined was selected above for SybaseRecordSeparator, then
!  SybaseUserDefinedRecordSepChar is a one-character entry that
!  describes the desired record separator character.
*SybaseUserDefinedRecordSepChar: &

!  DateTime Format used for temporary Sybase export files.
!  The following choices may be made:
!  1 = Combined (1 field), 2 = Time Ticks.
*SybaseDateTimeFormat: 1

!  This is the FieldSeparator used for temporary Oracle export files.
!  The following choices may be made:
!  0 = space, 1 = tab, 2 = comma, 3 = semicolon, 4 = user defined,
!  5 = colon.
*OracleFieldSeparator: 1

!  If user defined was selected above for OracleFieldSeparator, then
!  OracleUserDefinedFieldSepChar is a one character entry that describes
!  the desired field separator character.
*OracleUserDefinedFieldSepChar: %
```

```
!  This is the RecordSeparator used for temporary Oracle export files.
!  The following choices may be made:
!  0 = CR, 1 = LF, 2 = CR/LF, 3 = tab, 4 = user defined.
*OracleRecordSeparator: 2

!  If user defined was selected above for OracleRecordSeparator, then
!  OracleUserDefinedRecordSepChar is a one-character entry that
!  describes the desired record separator character.
*OracleUserDefinedRecordSepChar: &

!  DateTime Format used for temporary Oracle export files.
!  The following choices may be made:
!  1 = Combined (1 field), 2 = Time Ticks
*OracleDateTimeFormat: 1

!  This is the FieldSeparator used for temporary SQL Server export files.
!  The following choices may be made:
!  1 = tab, 2 = comma, 3 = semicolon, 4 = user defined, 5 = colon.
*SqlServerFieldSeparator: 1

!  If user defined was selected above for SqlServerFieldSeparator, then
!  SqlServerUserDefinedFieldSep is a one character entry that describes
!  the desired field separator character.
*SqlServerUserDefinedFieldSep: %

!  This is the RecordSeparator used for temporary SQL Server export files.
!  The following choices may be made:
!  0 = CR, 1 = LF, 2 = CR/LF, 3 = tab, 4 = user defined.
*SqlServerRecordSeparator: 2

!  If user defined was selected above for SqlServerRecordSeparator,
!  then SqlServerUserDefinedRecordSep is a one-character entry that
!  describes the desired record separator character.
*SqlServerUserDefinedRecordSep: &

!  DateTime Format used for temporary Sql Server export files.
!  The following choices may be made:
!  1 = Combined (1 field), 2 = Time Ticks
*SqlServerDateTimeFormat: 1

!  The following numeric color representations can be seen from the
!  SpectroGRAPH annotation toolbox.

!  This is the Main background color.  Default 119 (light purple).
*BackgroundColor: 119
!  This is the color of the frames on the background.  Default 251 (gray).
*FrameBackgroundColor: 251

!  This is the color of the darker text boxes.  This shows text entry fields
!  that are user modifiable.  This defaults to 249 (gray).
*DarkBackgroundColor: 249

!  This is the color of the menus.  Default is 251 (gray).
*MenuColor: 251

!  This is the color of most labels.  Default is 245 (black).
*LabelColor: 245

!  This is the color that the toggle buttons turn once selected.
!  Default is 249 (gray).
*SelectionColor: 249
```

```
!  This is the color of the text that appears in the text boxes.
!  Default 245 (black).
*WindowTextColor: 245

!  This is the color of the text that appears in menus.  Default 245
!  (black).
*MenuTextColor: 245

!  This is the color of text that appears in editable text areas.
!  Default 254 (light gray).
*EditableTextColor: 254

!  This is the font for the Menu Bars at the top of the screens.
!  Default: -*-helvetica-medium-r-normal--*-140-75-75-p-*-iso8859-1
*MenuFont: -*-helvetica-medium-r-normal--*-140-75-75-p-*-iso8859-1

!  This is the font that the labels use.
!  Default: -*-helvetica-medium-r-normal--*-120-75-75-p-*-iso8859-1
*LabelFont: -*-helvetica-medium-r-normal--*-120-75-75-p-*-iso8859-1

!  This is the font that the text fields use.
!  Default: -*-helvetica-medium-r-normal--*-140-75-75-p-*-iso8859-1
*TextFont: -*-helvetica-medium-r-normal--*-140-75-75-p-*-iso8859-1

!  This is the font that the list boxes use.
!  Default: -*-courier-medium-r-normal--*-120-75-75-m-*-iso8859-1
*ListFont: -*-courier-medium-r-normal--*-120-75-75-m-*-iso8859-1

!  This is the font that the Scheduler calendar screen uses.
!  Default:  -*-courier-bold-r-normal--*-140-75-75-m-*-iso8859-1
*MonospacedTextFont: -*-courier-bold-r-normal--*-140-75-75-m-*-iso8859-1

!  This is the file that will be searched for close sized fonts if the
!  specified font cannot be found.
!  Default: $WINDOWING_SYS_LIB_APP/spectrum.fonts
*FontAliasFile: /usr/data/Spectrum/5.0/app-defaults/spectrum.fonts

! SpectroGRAPH well known socket
*uisocket: 0xbeaf

!  This is the minimum width that a directory/file selection box
!  can be in pixels.
*FSBMinSize: 250

! Default Mail Service timeout value
*Mailtimeout: 30000

!  Flag that determines whether the stats output is in Regular (0) or
!  "List Attribute" (1) format
*ListAttrFormat: 0

!  This is for internal use only. Do not delete. Do not modify.
*InternalUseOnly: 268369951
```

Configuring Default Resource File Parameters During Installation

During Data Export installation, you can select the **Enable Custom Script Prompting** option from the SPECTRUM Installation Configuration window to establish the following default `SDE` operational settings:

Preferred Landscape Handle List (`PreferredLandscapes`)	Default landscapes from which data is exported
Definition File Directory (`DefFileDefaultDir`)	Default directory for definition files
Output Directory (`OutputDefaultDir`)	Default directory for ASCII output, SQL temporary files, and the SAS data sets.
Output Format (`OutputFormat`)	Default output format (ASCII/Ingres/SAS/Sybase /Oracle/SQL Server)
Post Export Script (`PostExportDefault`)	Default post-export script
Event Format Path (`EventsFormatPath`)	Default path for event format files

When you select the **Enable Custom Script Prompting** option, another window opens. It prompts you to answer a series of questions about resource file parameter settings. Type **Y** or **y** to accept the default value for the parameter referenced by the question. Type **N** or **n** if you want to change a default setting and enter another setting.

Figure D-1 shows example an custom script with sample answers provided for the questions asked by the script.

Figure D-1. Installation Custom Script Prompting

```
******* Begin Installing Data Export (datex.cus) *******

Is "0x11c000" the correct preferred landscape value (Hex) (y/n) ?n

Enter a landscape handle/list separated by commas:0x11c000, 0x440000

Is "0x11c000,0x440000" the correct preferred landscape handle/list (y/n) ?y

Is "/usr/data3/Spectrum/5.0/export.output" the correct Definition File
directory (y/n) y

Is "/usr/data3/Spectrum/5.0/export.output" the correct Output directory (y/n) ?y

Is "0" the correct Output Format (0 = ASCII, 1 = Ingres, 2 = SAS, 3 = Sybase,
4 = Oracle, 5 = SQL Server) (y/n) ? y

Would you like to specify a Post Export Script (y/n) ?n

Is "/usr/data3/Spectrum/5.0/SG-Support/CsEvFormat" the correct event
format path (y/n) ?y
```

Appendix E

Exporting To Other Databases

Describes how a post export script can be used to export data to other databases.

Data exports from SPECTRUM to a third party database can be readily accomplished using a post-export script that uses SQL commands to copy ASCII delimited data files to the designated database. To export to SQL output formats, Data Export internally exports to ASCII delimited files and then runs a script to import the data.

Both the Data Export import script and any post-export script you may specify need to know information about the ASCII exported files. Data Export provides this information in a post-export SPECTRUM parameters file. The name of the file is the same as the definition file name with the `.sprm` (for SPECTRUM parameters) extension appended to it (see *Organization Of The Post-Export Parameter File* on Page E-2 for the format of the `.sprm` file.)

The Data Export scripts that copy ASCII data into an SQL database can be used as a model for scripts to export to other database formats. The scripts (`SDEIngImport` for Ingres, `SDESybImport` for Sybase, `SDEOraImport` for Oracle, and for NT platforms only the `SDESqlServerImport` for SQL Server) read the `.sprm` file and the schema files (`.sch`) and create, copy, and index the appropriate tables.

Follow these steps to export SPECTRUM data into a third party database other than Ingres, Oracle, Sybase, or SQL Server:

1. Write a script or other executable file that will copy the ASCII data to the chosen database using information from the schema files and the `.sprm` file. The `.sprm` file will be passed as an input parameter when the script is executed. (This script can be modeled after the Data Export import script files.)

2. Create an export definition file to export to ASCII delimited files, specifying the necessary delimiters and format options for the target product. Specify the script executable created in Step 1 as the post-export script.

3. Perform the ASCII export or schedule it.

Organization Of The Post-Export Parameter File

The `.sprm` file contains the following items, each on a separate line:

Output directory path The location of any output generated during export. For ASCII exports, this is the location of the ASCII delimited files.

Database name (Blank if none)

For each selected data type, the following fields are included:

Spectrum exported data type One of the following: Events, Statistics, Model-Types, MT-Hierarchy, Models, Attributes, Associations, Relations, Rules, Ext-Attributes.

Destination name Where the output resides. For ASCII output, this is the name of the ASCII file in the **Output directory path**. For SQL output, this is the name of the table in the database. For SAS output, this is the name of the dataset in the output directory.

For Events or Statistics exports, the following lines are also included:

Output Mode Whether the new data is to overwrite or be appended to an existing table.

Data Range Start Beginning date/time for the requested data range. This date/time is in mm/dd/yy hh:mm:ss format.

Data Range End Ending date/time for the requested data range. This date/time is in mm/dd/yy hh:mm:ss format.

For example, an export of Relations and Models may have the following post-export parameter file:

`/usr/data/spectrum`	output directory path (where ASCII files reside)
`ctrondb`	database name
`Relations`	data type
`relation`	destination name (file name for ASCII)
`Models`	data type
`model`	destination name (file name for ASCII)

A post-export parameter file for a Statistics export may look like this:

`/usr/data/spectrum`	output directory path (where ASCII files reside)
`ctrondb`	database name
`Statistics`	data type
`stat`	destination name (file name for ASCII)
`append`	output mode
`04/17/94 08:00:00`	data range start
`04/20/94 17:00:00`	data range end

Appendix F

SAS Graph Examples of Exported SPECTRUM Data

Shows examples of how data exported from SPECTRUM with Data Export is depicted in SAS GRAPHs.

Figure F-1, Figure F-2, and Figure F-3 are examples of graphs produced by SAS/GRAPH from SPECTRUM data. The data for these graphs was extracted by Data Export into a SAS data set, which was then used as input to SAS's proc gplot.

Figure F-1. Example SAS Graph — Network Packet Rate

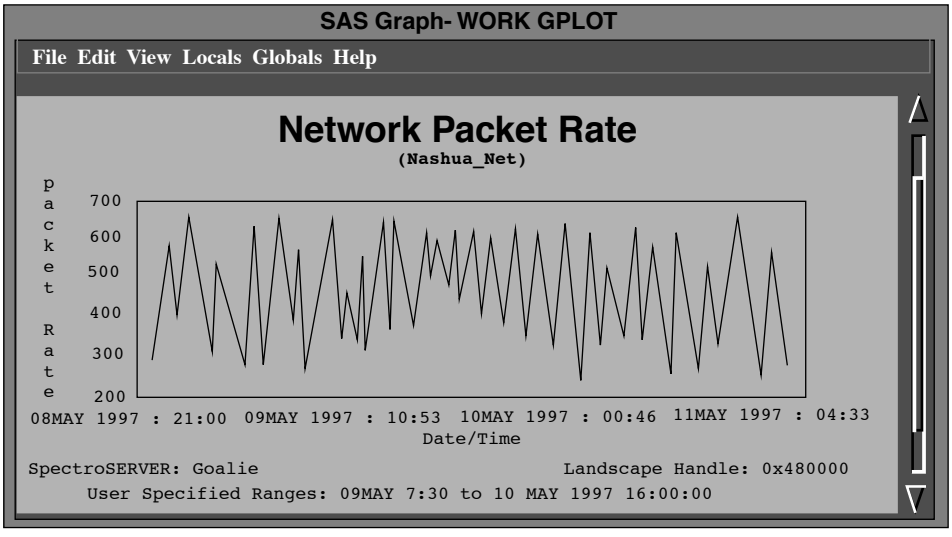


Figure F-2. Example SAS Graph — Load and Software Rates

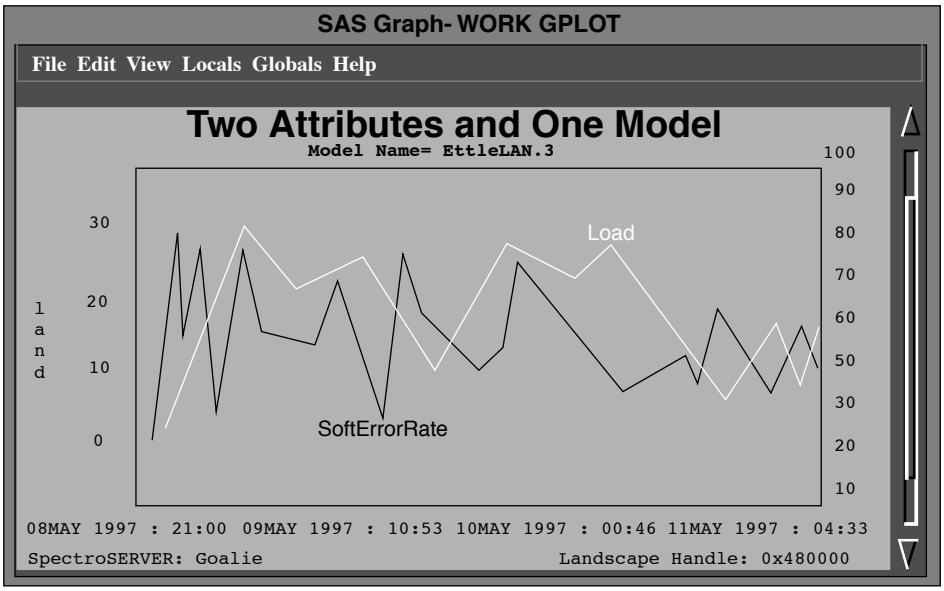
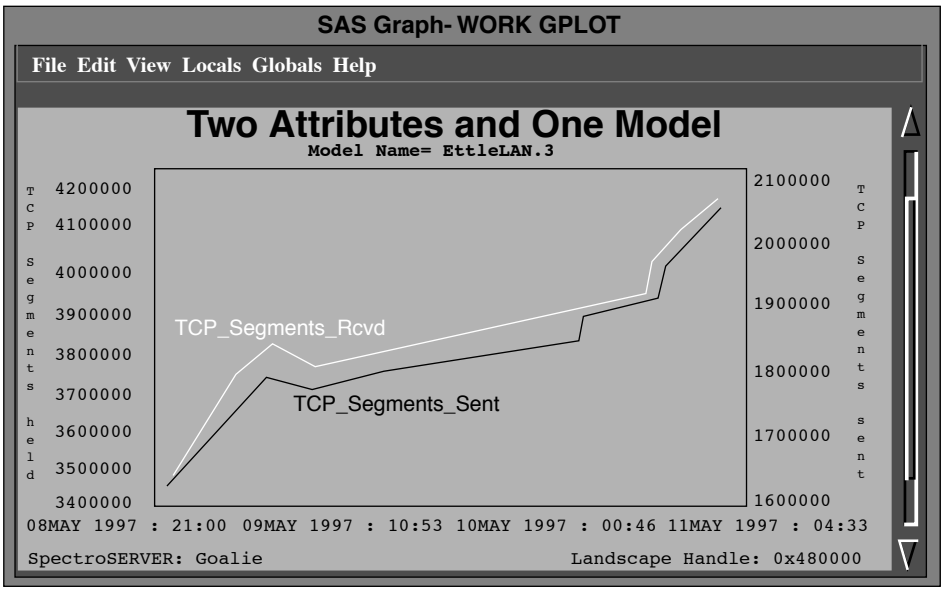


Figure F-3. Example SAS Graph — TCP Data Transmitted and Received



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